

# SUPPLEMENT.

## The Mining Journal, RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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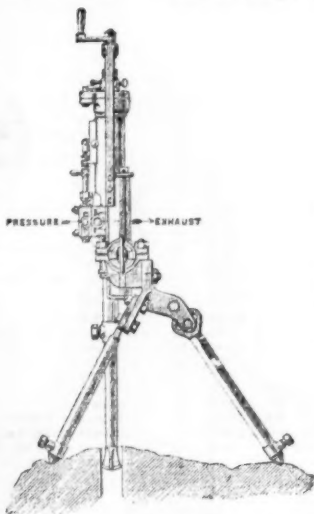
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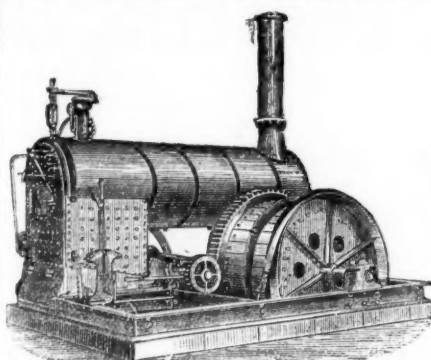
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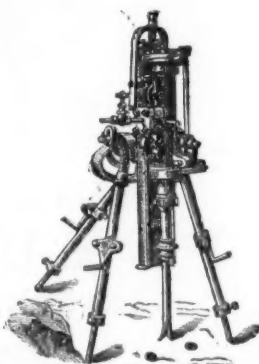
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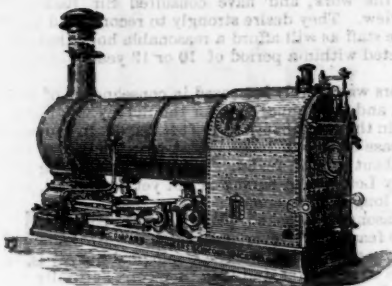
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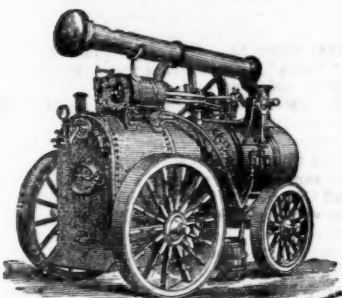
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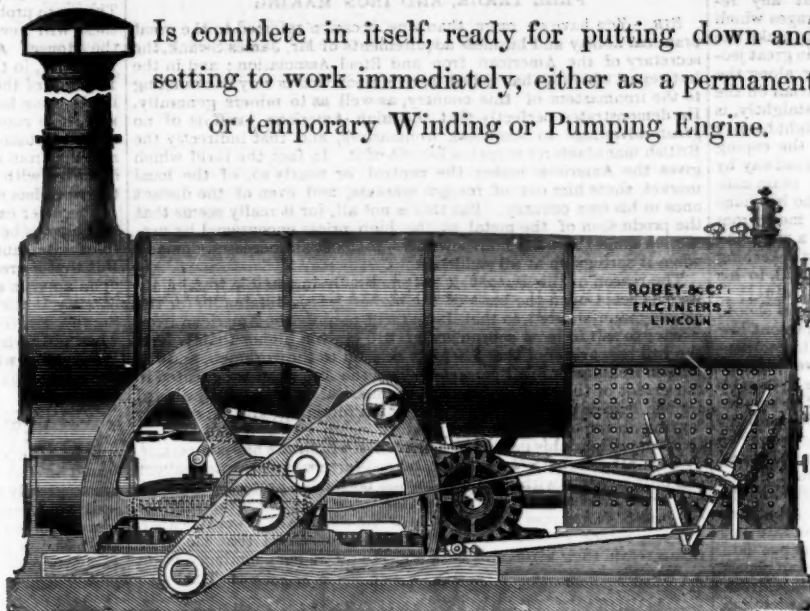
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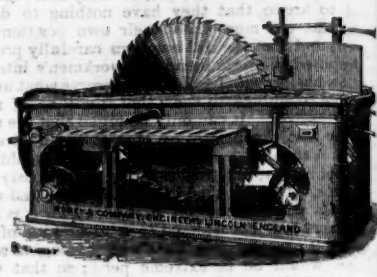


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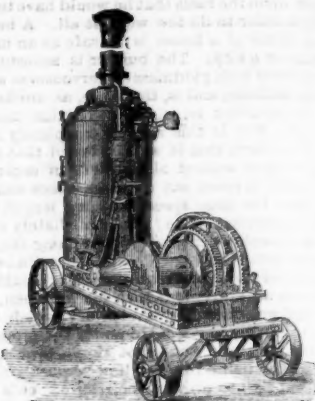
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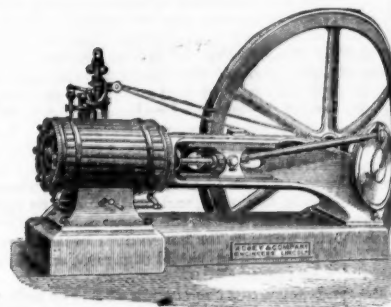
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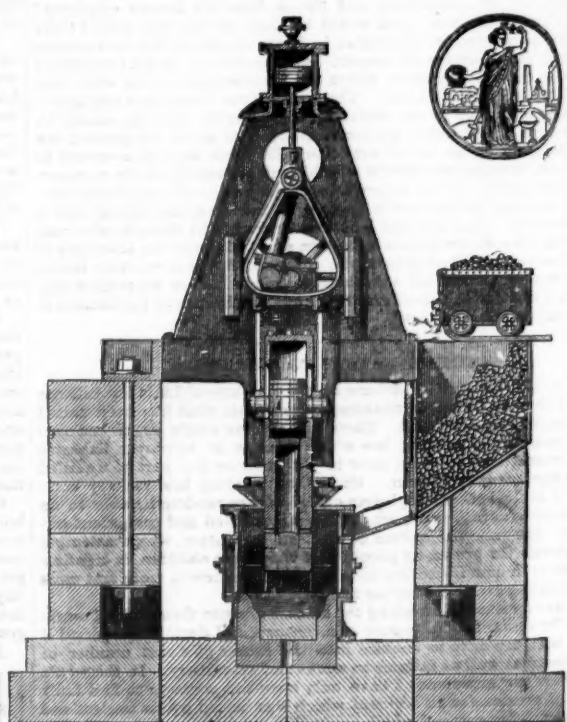
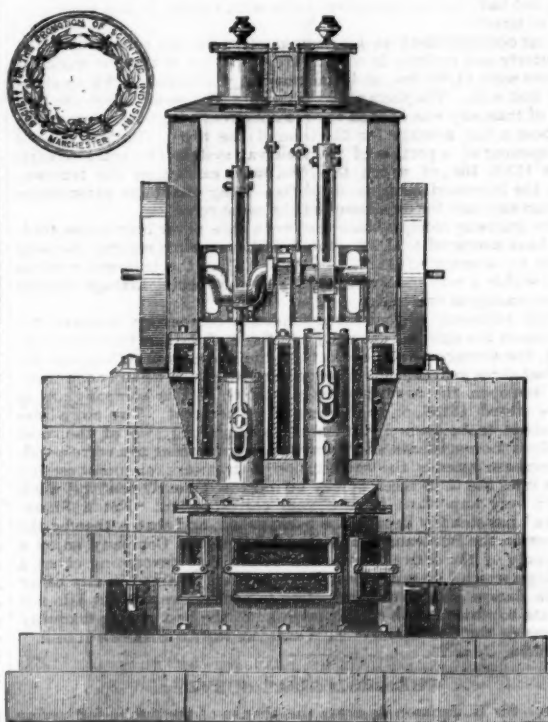
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## Original Correspondence.

## THE WORKMAN'S COMPENSATION ACT.

It was shown in last week's *Mining Journal*, upon no less authority than that of Lord Justice BRAMWELL, that the Government Bill now under the consideration of Parliament is, regarded from a legal point of view, useless or wrong; but, as many non-legal readers will be inclined to argue that they have nothing to do with what lawyers think, that the men know their own position with regard to the masters, and that the Bill has been carefully prepared by those who are supposed to comprehend the workmen's interests, it will be well to follow his lordship further, and observe what uncontrovertible facts he is able to adduce to show that it will be of no advantage to the men themselves. It can only be urged that the necessity for the Bill exists by first demonstrating that it would give the workman more protection than he has at present, that it would enable him to work in greater safety, and that it would not seriously diminish his wages. The latter, although theoretically unconnected with the question, is practically an all-important part of it; for it is an indisputable fact that a workman accustomed to a given kind of work is in absolute safety whilst performing that work, though a stranger in the same position would be in extreme peril; so that whilst the workman would consider, and very properly consider, without any reference to the danger, the question of the amount of wages which should be paid for the work, the stranger would have to make the bargain upon the basis that he would have to place his life in great jeopardy in order to do the work at all. A builder walking along the coping stone of a house is as safe as an ordinary pedestrian on the footpath of a city. The builder is accustomed to walk staidly, is not troubled with giddiness or nervousness at whatever height he may be walking, and is, therefore, as unlikely to step off the coping stone by accident as is the pedestrian to step into the roadway by accident. Nor is this all; so completely is the human brain controlled by habit that it will be found that the builder who has hundreds of times walked along 30 ft. of coping at 60 ft. or more from the ground is twice out of three times unable, even for a wager, to traverse at the same speed the same length of regularly laid kerbing without stepping aside; yet immediately afterwards he will, in his ordinary employment, safely pass along the coping stone again.

But to return to Lord Chief Justice BRAMWELL's letter, it should be observed that just as an employer could under the present law enter into an agreement with his workmen, undertaking to compensate such workman for any injury which he may receive while at work, so the employer could under the proposed law refuse to employ any workman who would not sign a form agreeing that the master shall not be liable for a fellow-servant's negligence. His lordship points out that to prevent such agreements being binding would be a most mischievous interference with the freedom of contract, and that he cannot suppose that anything so outrageous would be enacted. His lordship remarks that as an alternative arrangement the employer will hire men somewhat on these terms—"5s. a day and no liability, 4s. 6d. and liability, and I will either compensate you myself or apply the 6d. for an insurance for you." He has put 6d., but he believes a difference of a farthing would make the man choose no liability, and he repeats that the present claim for liability arises from the workman not appreciating that he receives the premium now, and yet would make the master the insurer. But his lordship further explains, and all who have even the most elementary knowledge of political economy will admit the accuracy of his explanation, that even if the law were made obligatory, in spite of bargains to the contrary, it would not profit the servant. Because it is certain there is a natural rate of wages, one fixed by what neither master or man can control, and that if they are practically added to one way they will be taken from in another. If a manufacturer now pays in wages 10,000l. in the year, and he is made to pay compensation to the amount of 1000l. a year, the wages paid by him will fall to 9000l. He cannot charge more for his produce because he has to pay more, and if he could his sales would diminish, and injury be done to the workman in loss of work.

What good, then, will the change do? The only thing which Lord Justice BRAMWELL has ever heard suggested is that it will make the master more careful in the choice of his servants. But, he asks, is he not under sufficient inducements to be careful already? Further, he asks, would the workmen like that system which has prevailed in some employments, and to which the masters would be obliged to have recourse—that of not employing a workman unless he produced a certificate of competency and fitness from his former employer? Still further, if some good would be done in this way would there not be more mischief in another? Every one knows the recklessness bred by familiarity with danger. Another thing. It is a respectable feeling, though mistaken, which prevents servants doing what they call "split" on each other. The consequence being that negligence leading to danger by one workman is concealed from the master by the others. And lastly, his lordship says that under the present law if the master by an act of omission fails in his duty to a servant he is liable, whether the failure is in himself personally, in his manager, or other agent. If the injury arises from an act of commission then the reasoning he has used is applicable, and the actual wrong doer is responsible. That any one who has carefully and thoughtfully read Lord Justice BRAMWELL's letter can still fail to see the absurdity of and insuperable objections to the proposed Bill is so unlikely that it may safely be predicted that however much its few supporters may press it there is sufficient intelligence in the Houses of Parliament to prevent its becoming law.

## COMPENSATION TO WORKMEN.

SIR.—The interesting debate on the Employers' Liability Bill has more than justified the unanimous opposition that has been raised by employers to the Bill. There was not one single argument used in favour of the existing law which renders an employer liable to the general public for an error in judgment on the part of a skilled and competent workman. Under the existing law railway companies and all other employers of labour are rendered liable to an unlimited extent for the acts of the most skilled and competent servant. The paternal system of modern legislation, which attempts to provide for grown-up people as if they were children, is creating obstacles in manufacturing industry which renders it more and more difficult to provide labour for the population.

I have assisted in directing the labours of some thousands of workmen for upwards of a quarter of a century, and during this period it has been my duty to enquire into the causes of a vast number of accidents, as well as failures to works and machinery. In the whole course of my experience I have only once had occasion to find fault with a foreman for an accident which was caused by his neglect and want of judgment, and which resulted in injury to a workman. The attention of employers of labour and their agents is being incessantly directed to the prevention of accidents. No accident occurs without involving the proprietor in losses of a more or less serious character. In the debate on the Employers' Liability Bill Mr. Broadhurst alluded to a case of defective scaffolding. The law as it now stands renders an employer liable for such accidents. Would it not have been a gross injustice if that gentleman when he was a workman had had the misfortune to drop one of his tools from his scaffold on to the head of a passer by, and his employer had been held liable for unlimited damage for an act to which he had not contributed, or had the slightest control over? If the law of common employment is altered as proposed it would involve perpetual animosities and disputes with workmen. The great mass of accidents occur from the negligence or omissions of workmen themselves. Foremen are perpetually remonstrating with workmen for their recklessness and unnecessary disregard of danger. So long as any description of work has to be conducted by human agency accidents will occur, the proportion varying with different trades and employments. Employers of labour know that accidents are inevitable, and there has been a constant and growing disposition to provide by mutual insurance for these contingencies, and the most steady and industrious workmen prefer employment under firms and companies where such provision is made.

If a Select Committee is appointed to enquire into a system of in-

surance there will be no difficulty in proving that accident funds can be established on a fair and equitable basis. Our Accident Fund is established on the basis of mutual annual insurance. Each member's subscription is less than the average amount required to meet the annual liability, the difference being provided for by the company. If the existing law as to common employment is altered, and the employers held liable as they now are to the general public, they will be involved in continuous litigation and conflict with their workpeople. The numerous accident and benefit funds that have been created in late years by the mutual co-operation of masters and workmen mark a special period in the social relations of our manufacturing industry. These funds have materially contributed to mitigate sufferings caused by accidents, but they will have to be abolished, and the great mass of persons injured by their own acts will under the proposed law have no remedy, and will be left destitute. The great body of workmen are too just and honest to desire to impose an unjust liability upon their employers, and from extensive enquiry I have made I find the working classes take little or no interest in the Bill, which if passed would in my judgment be as detrimental to their own interests as it would be to the trade of the country.

CHARLES MARKHAM.

Staveley Works, near Chesterfield, June 17.

## FREE TRADE, AND IRON MAKING.

SIR.—You have on more than one occasion referred to the great practical ability and business acquisitions of Mr. James Swank, the secretary of the American Iron and Steel Association; and in the last report which he has issued there is much that is very encouraging to the ironmasters of this country, as well as to miners generally. He demonstrates perfectly that the high American tariff is of no great advantage to American ironmasters, and that indirectly the British manufacturer reaps the benefit of it. In fact, the tariff which gives the American maker the control, or nearly so, of the local market shuts him out of foreign markets, and even of the distant ones in his own country. But this is not all, for it really seems that the production of the metal at the high prices encouraged by protection almost renders him powerless to meet an increased demand when it springs up at all suddenly.

The reason of this is that it is practically impossible to regulate wages except upon the basis of the highest prices obtainable for the article manufactured, so that if the tariff permits the American ironmaster to sell to local consumers at \$10 per ton higher than before, the full proportion of that \$10 must be paid to the workmen, and the British ironmaster in all markets except the American is benefited to the extent of the extra wages paid in America. It is obviously absurd for the British producer to complain of a foreign producing country levying an import duty on the produce which he has to sell because that duty extends his market elsewhere and withdraws one competitor. Two countries equally well circumstanced for raw material and labour can only compete with each other when both have protection or both free trade, and when one only has free trade that one invariably has the best of it, because the sale price at the works is of course cheaper. For this reason I think we should be well contented that the Americans retain their tariff, and be content to retain our confidence in—

June 15.

FREE TRADE.

## BORDEAUX TRAMWAYS AND OMNIBUS COMPANY (LIMITED).

SIR.—I have noticed a letter in last week's *Journal* signed, "Not a Shareholder." Why a gentleman in the position of a non-shareholder should take the trouble to write to the papers is somewhat inexplicable. Perhaps he has heard of what the Bordeaux Tramways are doing, and their rapid development, and, therefore, desires to change his position and become a shareholder something under present prices. It is evident he is totally ignorant of the present position of the company, and I will, therefore, endeavour to enlighten him. The statements made in his letter are widely at variance with the facts, and I have to request that you will allow me space in next week's *Journal* to enable me to lay before your readers a correction on the various points upon which your correspondent has exhibited so much ignorance. In the first place, there is no such obligation that the company "have bound themselves to keep up in repair the pavement of all the streets on the extent of their system." The fact is they are bound in common with other tramways in Europe to keep in repair the paving or macadam, as the case may be, between their rails, and for 50 centimetres (say, 18 in.) on each side of the outer rail, but have nothing whatever to do with repairs in any other part of the streets.

Your correspondent in his statement about the returns seems to be utterly and entirely in a fog. He states that in the first week the returns were 14,000 frs., and that now they have come down to about half that sum. The facts are as follows:—The week before the first line of tramway was opened the receipts from omnibuses were 1173l.—about a fair average for the time of the year. The first week of the opening of a portion of the tramway system the total receipts were 1532l. 10s., of which 481l. 16s. were earned on the tramway line, the increased receipts—359l. 9s.—being due to the substitution of tramway cars for omnibuses on the same route.

The tramway receipts since that week have never been below 400l., and have averaged 431l. 12s., the omnibus receipts making the total up to an average of 1623l. per week. Thus the tramway receipts have within a very small sum kept up to the opening average, instead of decreasing to one-half.

With reference to your correspondent's comparison between the receipts of the existing company and those of the late Omnibus Company, the average weekly receipts of the late Omnibus Company for the last three years of its existence were 1018l. With only one tramway line open the average weekly receipts of this company are as above stated 1623l., or an increase of 60 per cent. Two more lines are about to be opened early next month, along two of the most populous thoroughfares, and if anything approaching to a corresponding increase attends the substitution of tramcars for omnibuses on those lines the total receipts may be increased nearly cent. per cent.

One very important feature your correspondent "Not a Shareholder" has steadily kept in the background, and that is that by the concession the Bordeaux Tramways and Omnibus Company enjoy a monopoly of the entire locomotion of the City (excepting cabs), a privilege which I do not believe has ever been obtained in any other city in Europe. In contradistinction to your correspondent I do not hesitate to state that this will prove one of the best paying tramway systems on the Continent. A WELL-INFORMED SHAREHOLDER.

London, June 25.

## THE GEOLOGICAL SURVEY.

SIR.—Sir H. Jackson deserves the thanks of the public for having directed the attention of the House of Commons on June 4 to the slow rate of progress of the Ordnance Survey, and it is to be hoped that the interesting discussion which his motion on the subject excited and your excellent leader on the same subject may tend greatly to expedite the work. Mr. Adam, the First Commissioner of Her Majesty's Board of Works and Public Buildings, who is responsible to Parliament for the management of the survey, informed the House that "the survey of the whole of England could not be completed before the year 1898"—a statement which caused not a little surprise and disappointment. Mr. Adam was, of course, only the mouthpiece of certain permanent officials, on the accuracy of whose representations he must rely. Now, Sir, experience has shown that the permanent officials of our public offices have often made serious mistakes, not only in their estimates of expenditure but also in their predictions concerning the duration of temporary public works, and that high non-permanent officials, like Mr. Adam, may likewise err I will, with your permission, give the following proof:—

The rate of progress of the Geological Survey of Great Britain and Ireland has from time to time been the subject of comment in Parliament. This survey is under the direction of the Lords of the Committee of Council on Education, and in their report of the Science and Art Department, dated Dec. 17, 1866—a report which was presented to both Houses of Parliament—are these noteworthy statements:—

"My Lords are of opinion that the present prospect of the com-

pletion of the survey, whether viewed economically or as a work of national importance, cannot be considered at all satisfactory. The sooner the survey is completed the greater will be its value, while every year of delay lessens that value and is a serious inconvenience, especially at the present time, when the resources in respect of coal and the supply of water have become questions of the first importance. Their Lordships think, therefore, that arrangements are urgently needed to expedite the work, and have consulted Sir Roderick Murchison with this view. They desire strongly to recommend such a reorganisation of the staff as will afford a reasonable hope that the survey may be completed within a period of 10 or 12 years"—i.e., in 1879 at latest.

The staff of surveyors was largely increased in consequence of this expression of opinion, and the annual vote for the Survey was raised from 12,126l. 13s. 6d. in the year 1866-7 to 19,654l. 2s. 6d. in the year 1867-8, being an increase of about 7500l. Last year the cost of the Survey amounted to about 23,306l. 2s. 8d. But, notwithstanding the confident hope of "My Lords," the survey is not yet completed, nor is it likely to be for a long time to come.

The question may reasonably be asked, "Will it ever be completed?" The answer, it may be feared, is "Never, until the House of Commons determines peremptorily that it shall." The Geological Survey is, of necessity, temporary in its character, and it is, therefore, naturally the interest of everyone of the staff to prolong it as much as possible. There are probably other causes in operation which favour delay, but these will never be ascertained except by an acute committee of the House. A mere departmental enquiry would be of no avail. Formerly, in the time of the late Sir Henry De La Beche, the first Director of the Survey, the surveyors were not allowed to reside long in the same locality, but were kept actively moving to and fro. But now, it is rumoured, this is all changed, and the surveyors are permitted to take leases of houses for their residences during periods ranging from two to seven years. If this be so, those who are acquainted with field surveying of any kind will not be surprised that the work has not more rapidly advanced of late.

The utter extinction of the Survey is not to be recommended, as it will always be desirable to retain a small staff of well-trained men to examine and record the results of future geological discoveries. But that a great reduction in the staff should be speedily insisted upon appears obvious, especially after the strongly-expressed opinion of "My Lords" above quoted. During the debate on the Ordnance Survey, Mr. Gladstone said that, as Chancellor of the Exchequer, he "had not a shot in the locker." If he will turn his attention to the Survey, he will easily save some thousands of pounds annually, to the advantage of the public and without the slightest detriment to science.

OBSERVER.

## NEW FLAGSTAFF CONSOLIDATED COMPANY.

SIR.—The statements contained in the letter signed "Verax," inserted in last week's *Journal*, reflecting on this company's property, are so grossly untrue, and such evident care has been taken to mislead your readers, that no doubt is left in my mind that the letter was concocted by, say, the representative of a clique which has during the past few years earned no little unenviable notoriety. "Verax" endeavours to make considerable capital out of the so-called Nabob and Virginia suit. Would he be surprised to learn so little was thought of the trespass that the Court was unable to declare what the damage was, and whether there had been any, and left it for assessors to decide. Does "Verax" not know that these tremendous damages amounted to less than 40l.?

The malicious intent in the statement that the Virginia is located on no lode will be apparent when it is understood that the claim actually covers a portion of the Flagstaff lode for nearly its whole length, on each side of the divide, and that about 1000 feet in length of this location is superficially the same as was thought to be the original property of the old Flagstaff Company. The simplicity of "Verax" is quite touching, and I am sure he will be pleased to know (*vide Prospectus*) that the Nabob claim also has been secured to the New Flagstaff Company, embracing thus as it were the whole of the Great lode for more than 2000 feet in a "ring fence." There is now no fear of black-mailing suits or jumpers. Perhaps "Verax" is not unacquainted with the district, and will, therefore, appreciate the great advantages thus acquired. Let him rest assured his amiable suggestion that "the titles contracted for" should be "settled" has long since been carried out.

The inaccuracy of his data respecting the South Star and Titus are equally as glaring. No ore ground whatever has been touched on the south-eastern portion of this property for its whole length below the No. 3 level, whilst the longest level had reached but 200 ft. only from the shaft when the injunction was granted by the Utah Courts restraining the old company from further development on that side, so that all this ground is correctly stated as virgin ground. Professor Vincent, in 1878, calculated there then remained about 5000 tons of first-class ore standing in one stope above the third level, the ore going down in a strong and defined lode. Has not guileless "Verax" himself seen the plans and sections at the old company's offices, and has he not on more than one occasion received explanations on this matter? Verily, "Verax," "eyes are picked out" in more senses than one.

Inaccuracy is again rampant in the concluding paragraph—that the reports on the mines relied on are those issued *prior*, &c.; why not have been honest, and written *concurrently* with, &c.? It would have been so simple, and all the shareholders are aware of it. "Verax" is, no doubt, quite familiar with reports (cooked and otherwise) on mines. Does he not think it much more advisable to judge from tangible results down to the present year, with the fact established, as per advices so late as April last, that recent further discoveries have been made in the lowest level, showing that the ore bodies are still trending downwards, as prognosticated by expert mining engineers, than by issuing a report tinged with such imaginative descriptions as the unfortunate fiasco—? "Verax" knows, so does your correspondent.

M. E.

## GOLD MINING IN BRAZIL.

SIR.—I notice in the *Journal* of June 12 a letter on the subject of the Brazilian Gold Mine of Pitangui. Your correspondent's statements are substantially correct, though perhaps he may be somewhat over sanguine. The noble returns of gold at Pitangui for May last amount to some 3000l. from washing only, and that but imperfectly done; and your correspondent seems to consider he is justified in assuming every month's return will be as prosperous, and that there will be an income of 36,000l. per annum. Very possibly he is right, but in such matters it is as well not to hasten to induction too rapidly.

Pitangui Mine is a remarkable success, but though situate at no great distance from the commercial centre of Rio Janeiro it is as little known to the general public as if it were in a remote corner of Zululand. Perhaps as an undertaking that seems likely to make its way some little account may be acceptable to your readers. Pitangui, then, is in the Brazilian high lands, and consists of that peculiar stratum of auriferous ground called jacutinga, or soft ground as compared with rock, to give some hasty explanation of the term. It has been worked for ages from the surface by native and other miners. Large fortunes have been made there by Brazilian families, for there are some 80 lines of gold known there—ramifications of five principal veins of gold that all bear their respective appellations, as the Bahu vein, Ouro Podre vein, &c. It will be understood, then, that all the upper portion of this vast auriferous stratum has been ransacked by old miners, who all persevered in their quest till stopped by water at one uniform depth. Below this they never could proceed. They had no proper machinery, and under any circumstances it would have been a work of vast difficulty, so powerful has the water proved to be.

The present company were advised to drive a tunnel from a valley into the jacutinga bed at a depth of some 20 fms. below all previous workings. This was for the twofold purpose of unwatering the mine and obtaining a great depth of what it was presumed would be ore ground to operate on. The tunnel was begun in 1876, and though the operation was long and toilsome, all went well till the soft ground was reached, when the water proved almost overpowering, and for many months it all but suspended operations.

At last it seems to have exhausted itself, and great discoveries have



ready been made. Nothing was ready for conveying the auriferous deposit to surface, or for washing it when there, and stamps are not yet erected; yet an experimental washing of only three days in December last yielded about 500*l*. To avoid waste, as nothing was yet ready for the purpose, all further washing was suspended till April 19, when another short renewal gave 477*l*, and a cablegram has recently given the results of May washing at 3006*l*. All the hard portions are kept in stock till the stamps are erected. Thus, 4000*l*. present an earnest of success, and the prospects of the company are, therefore, most encouraging. The tunnel will be driven under the rest of the ground, and will probably intersect all the other auriferous veins, which may be fairly expected to prove more or less rich, as they were in the ground above. I have already said Pitangui is not known in London as it ought to be. It is chiefly in the hands of, and well managed by, a few mercantile men of Liverpool, who quietly await results and view market prices with perfect nonchalance. Market, indeed, there seems to be none, for no sellers exist. Let us see if we can arrive at some logical approximation to value. The Indian gold companies are in 100,000 shares of 1*l*. each, and are quoted at a market value of 2*l*. Pitangui is only in 25,000 shares of 1*l*. each, with 10*s*. called up. At this rate alone, all other things being equal, Pitangui should stand at 8*l*. But the Indian schemes, however promising, are thus far but mere paper schemes with an untried management and not a stroke of work done. At Pitangui difficulties have been overcome, all hard work is done, the treasure is found, and merely awaits realisation. PACTOLUS.

#### CARDIGANSHIRE—CROWN MINERAL GRANTS.

SIR.—Your correspondent "Plynlimmon" does not touch one of the most unfair terms in the Tack Notes granted by Her Majesty's Woods and Forests, which is that the holder must pay them one-fourth of any consideration for such Tack Note, and if the consideration should be shares then the nominal value of the same shall be taken to be the value, and one-fourth of such value must be paid in cash. Thus if I expend a sum of (say) 200*l*. on one of their sets, and agree to sell to a company for 1000*l*. in fully-paid up shares, I must hand over the Woods and Forests 200*l*. in cash, that sum being one-fourth of the consideration received less one-fourth of my expenditure, so that in the event of the mine not turning out a success eventually I am exactly 400*l*. out of pocket through having been fool enough to venture my money on Her Majesty's mineral lands. In America, where all minerals belong to the State, I can go where I like and search, and demand a location free of all charge.

The present system of the Commissioners is intolerable, and I feel certain that if the matter were properly put before Parliament some relief would be granted. For my own part I should be satisfied with the following reforms:—1. Abolition of the above-mentioned clause. —2. Reduction of the royalties from 1-12th to 1-16th. —3. Reduction of the price for tack-notes to a moderate and uniform rate. —4. Extension of the tack-notes from one year to two years.

These are not extravagant demands, but would be gratefully accepted on all hands. I would further, to prevent large tracts of land getting into one or two hands, make a provision that no lease should be for more than 250 acres; thus, if any tack-note gave me the right of search over 500 acres I should be allowed to select one plot of ground therefrom not exceeding 250 acres, to be selected by me in any way I chose from the original tack-note. I trust other of your readers will, through your columns, support this reasonable reform, as I hope before the present session ends to be able to present a petition to the proper quarter for redress. The ex-member for Cardiganshire pledged himself to take the matter in hand if re-elected, and I feel sure the present member will do all that is in his power to further the matter. CEREDIGION.

#### LEAD MINES—A SUGGESTION.

SIR.—A careful perusal of your correspondent Experience's letter compels me to come to his way of thinking. Were it simply a matter between mines which are lead producing and dividend paying, no doubt the withholding of ore from market would be desirable; but, as your Correspondent suggests, a rise in the price of lead would only favour the growth of mushroom mines, of which we already have enough. I see Mr. Absalom Francis, acting on his own suggestion, intends only to sell 30 tons of lead from one of his mines. I fancy that the quantity of lead that gentleman withholds from market will hardly affect prices for the present.

There is no doubt that to really *bona fide* mines the low price of lead will in the end prove a boon, as it will starve out a lot of mushroom undertakings never really worthy the name of mines, but which seem to have as many lives as a cat, and reappear time after time under new names, and with promising reports. It is a pity that there is no reliable source from which investors could obtain independent information with regard to mines, more particularly the lead mines of Wales. Never was mining in Montgomeryshire and Cardiganshire at a lower ebb, simply because the public have so often been deluded into these mushroom concerns, and as often lost their money.

I wish the gentleman who writes your report for this district would give us a little more of his able and fearless criticism. I do not think he gives us as much of his notice, for either blessing or the other thing, as we deserve, especially the latter. MINER.

June 23.

#### LEAD MINES—A SUGGESTION.

SIR.—I was glad to find in last week's Journal a letter, signed "Miner," intimating that my suggestion for curtailing the produce of lead until better prices are realised would be adopted by some of the principal lead mine producers. In the same Journal there appears also a letter, signed "Experience," the absurdity of whose remarks are so transparent as to be unworthy of notice. What the monkey, the cat, or the roasted nuts had to do with my suggestion it would be difficult to unravel; but it would not be so difficult to prove that a party would be playing a very monkeyish trick by selling his produce for 14*l*., which by proper management he should obtain 18*l*. per ton for; in fact, such a production as that of "Experience" makes one feel that Mr. Darwin was not far wrong in his theory that "monkey" was the original of man.

Grogan, Aberystwith, June 23.

ABSALOM FRANCIS.

#### ROCKS TIN MINE

SIR.—About seven or eight months ago there was much said about a great discovery of tin at the above mine. In every place of resort—at the street corners, and even on the public road—one could hear noised abroad tidings of this famous discovery. In your own paper the matter was pretty extensively discussed, as well as in many others more local in their pretensions. The result of all these discussions was very favourable to Rocks. Some said the discovery was worth fabulous sums of money. Some said aloud that it was "very fair," but whispered that they wished they had been the proprietors. Altogether one was led to expect great things. In the heat of all the gossip, and for the sake of verifying the truth of the reports, I visited the mine, and communicated the result of the visit to you. I considered from the collective evidence present that the affair was well worth prosecuting vigorously, and expected that early steps would be taken for that purpose. Being pretty well acquainted with Cornish mining in its practical and scientific aspects I felt anxious that the discovery should receive adequate attention; and, consequently, I was particular in laying the matter circumstantially before you. As a critic apart from all parties interested, and ignorant of what may be going on behind the scenes, I should like to ask the proprietors whether they intend keeping the mine in its embryonic state much longer; and whether this is not a good time, in every sense, for making a decisive movement in the way of development?

It must not be understood, however, that the mine has not been in progress since the first reports were circulated. Very extensive testing has been resorted to, several shafts sunk, a portable engine set to work, men kept constantly employed, and the lode cut through in other places with results extremely flattering. Now, I would ask—Is it not possible to continue this testing too long; does correct theory necessitate this delay; and, if not, why postpone active operations on an efficient scale? Hope is still large, facts still promising, and expectation of good things still alive. The mine has been visited by some of our best men, and the reports are presumably very favour-

able. Adverse criticisms and bad reports, if they exist, are sure to ooze out. So, as there have been no such reports, we must conclude that those connoisseurs in mining have thought highly of the speculation. Now, what is to be the result? Let us leave that an open question, and call upon the proprietors to answer it. OBSERVER.

Roche, June 22.

#### WHEAL CREBOR, AND THE "BEARS."

SIR.—The scandalous attack upon Wheal Crebor has been met by a most determined resistance, and the issue of the conflict will be the complete discomfiture of the combination that has sought to make money by selling shares (which have no existence) in order to knock the price down in the market, hoping to buy back the shares on the settling day. The official report upon Wheal Crebor, only ten days ago, was that the mine never looked better, and it is an insult to the common sense of the shareholders to now say that the mine never looked worse; for with so many points to value it is manifestly impossible that a mine like Crebor—paying dividends, with large reserves, and a splendid piece of ground recently given to the company by the Duke of Bedford—can have fallen off in value in a few days to any practical extent. The whole thing is a clumsy trick, and I am glad to know that it did not originate in the London market, but was started by a few people in Tavistock with a very good character for mendacity and a sublime opinion of their own powers. It is not the first time that these cunning schemes have recoiled upon the originators, and it will be interesting to watch the result at the end of this month.

The *bona fide* shareholders in Crebor must not, however, unwittingly assist the "bears" by lending the shares to brokers for a consideration of a few shillings per share. Let every person who has bought shares insist upon their delivery at the end of this month, and if the shares are not forthcoming let them write to the Committee of the Stock Exchange, and the sellers will soon be compelled to pay a stiff price to settle the bargain. The future of Crebor will be greater than some people have any idea of, and the present low price of the shares gives to investors an opportunity of picking up a bargain which may not again occur, and of which they should take advantage.—London, June 24. A LONDON DEALER.

#### WHEAL CREBOR—A CAUTION.

SIR.—Let me caution your readers against parting with a single Crebor share. I have good reason for knowing that an important communication will be shortly made, which may immensely enhance the value of the property. The mine has been specially inspected lately, and will be carefully inspected next week, and it is now ascertained that the extraordinarily powerful buying has been instigated by the most practical men in the market, who are alive to the importance of the communication I refer to. Verb. sup.

Tavistock, June 24.

ONE WHO KNOWS.

#### WHEAL CREBOR.

SIR.—Your correspondent last week says some 2000 shares have been bought and will be taken off the market this account; but he has much understated the figures. Three gentlemen alone have bought over 2000 shares, and about 2000 shares have been bought by old shareholders in London, who have taken advantage of the low price to which the shares have been forced to increase their interest. These shares I find will all be paid for, and the consequence of this will be a rise to at least 8*l*. per share. The price of the shares was 3*l*. when the "bears" started the attack; while I write they are 4*l*., and very hard to get; and if they steadily rose to 10*l*. I should not be astonished, for there is nothing like a "bear" market to send up prices.—London, June 25. A SHAREHOLDER.

#### WHEAL CREBOR.

SIR.—We have received so many inquiries in reference to this particular property that we will ask you to be good enough to allow us to state, for the benefit of those interested, that we have bought shares very largely for investing clients this week without any hesitation, as we have entire confidence in the property, and firmly believe the report received will be fully borne out in the future development of this mine. In the opinion of those best qualified to judge there is a large oversold account open in the shares, and there is little doubt that those who ought to have known better have connived at it. Those shareholders who now keep their shares will, therefore, have the satisfaction of knowing that the market price will advance *pari passu* with their intrinsic merits, and that Crebor shares will be quoted at a much higher figure ere long. JAS. SCOTT AND CO. Copthall Buildings, London, June 24.

#### CORNISH MINING—ITS UNWROUGHT GROUND.

SIR.—Of unwrought copper and tin ground in Cornwall there is an inexhaustible field. The capital required to prove the value of the different sections of unexplored ground known to the writer is small even compared to the promotion money alone paid for some bubble schemes introduced by our friends across the Atlantic. In the vicinity of granite hills, strong masterly lodes in connection with elvans abound, and wherever intersected by cross-courses results have invariably been well paying deposits of mineral. It is with this view I have selected a piece of mining ground, and at the request of my mining friends have offered one-half of it to the public without fee or reward, content to be remunerated from profits derived from the legitimate prosecution of the adventure. A glance at the prospectus in to-day's *Mining Journal* will convince the most sceptical of its value. I do not anticipate an outlay of more than the application and allotment call to bring it to a profitable paying state—indeed, the ore ground driven over in the adit for 40 fms. long is a justification for this statement. Immediately a steam-engine of about 40-hp. diameter cylinder is erected, which will be sufficiently powerful for all requirements, sinking will be commenced in the ore ground, and a mine of wealth opened. CHARLES BAWDEN.

St. Day, Scorrier, Cornwall.

#### MOSTYN CONSOLS.

SIR.—Observing the letter of "Alpha" in last week's Journal I have great pleasure in confirming all he says about the property, and although I am a stranger to "Alpha" I was rather disappointed, and could have wished him to have said more, and I also wonder if he had passed the West Holway Mine on the road to Holywell, if so he must have seen on the bank there some grand specimens of ore—masses, I should say, of 2 to 3 cwt. each—just raised from the mine out of the Holway lode, and I am certain he would have met with in Capt. Howland (the manager) a gentleman of sterling and practical knowledge. Now, Sir, it struck me if such masses could be raised from one lode (the Holway), what ought to be expected at the junction of several well-known and masterly lodes which have been found in the Furness shaft of the Mostyn Consols, and I believe fully inspected by those well-known mineralogists Mr. Goodman Ellis and Mr. John Lloyd (the duke's mineral agent), who have reported thereon in a highly favourable manner, and I think, Sir, that even you will admit that these gentlemen stand too high in their profession to give any but a sterling opinion on the merits of mining property. Mr. J. Lloyd says in his report—"I have known the property for over 30 years, and endorse all that Capt. Ellis has said about it." Capt. Ellis says these are masterly lodes indeed, and I find nothing whatever to prevent your carrying out any object, and I certainly do think you ought to be proud of yourselves in possessing such a property. We have a precedent in the well-known Van, and I believe the Mostyn Consols is such another.

I have as yet seen no official prospectus or advertisement about these mines, but from a draft prospectus for private circulation only I have now before me, I will state for the benefit of your readers that the company consists of 20,000 shares of 1*l*. each fully paid up, and that I know of three directors who have taken 1000 shares each, and I believe upwards of 5000 shares have been disposed of. I am not aware whether any will be offered to the general public. Here then, Sir, we have another proof of how quietly a good property is taken up and launched without bustle or noise, and it is in this way that many valuable properties are worked, and in confirmation thereof I could cite a dozen, such as the Van, Minera, North Hendre, Gorsedd,

&c. Knowing your willingness to notice authentic information your well-known Journal must be my apology for troubling you with these remarks. JUDITH.

#### SHORT NOTICES ON IRISH MINES.

BY WILLIAM THOMAS.

To the east of Kenmare the River Roughty runs for several miles through a lovely valley. At the north side it is sheltered by Muggerton and other mountains, and also on the south side by Muggerton and other mountains, which are a continuation of the great clay-slate formation extending inland from the Dursey Head. The Roughty valley is about three-quarters of a mile wide consists of the carboniferous limestone formation, in which rich veins of galena were superficially worked for miles in length on the run of the veins about 200 years ago, and are still distinctly visible on the surface.

About two miles east of Kenmare there is a remarkable outcrop of carbonate of lime, and of great extent, near which about 200 years ago Sir William Petty carried on extensive ironworks for many years with great vigour and profit, but when the works for smelting the ore were exhausted he abandoned the works, and they have never since been reopened. These old works are of great superficial extent, and as copper lodes and lodes of galena pass through or near them, and also the great formation of carbonate of lime, it is more than probable that abundance of metallic mineral will be found with a small outlay in this spot; a valuable stream of water runs through the old works. In another part of this property, about 26 years ago, one of the old silver-lead works were cleared of rubble and water under my superintendence, and in sinking the shaft 6 fms. and stopping a few fathoms we raised and dressed by hand labour shipped 117 tons of silver-lead ore. The lode in the shaft is still good as ever. In other places in this property, in old pits 8 or 10 fms. deep, silver-lead ore and blende may be quarried, also arsenic pyrites. There is water power for driving any amount of machinery. This property belongs to the Marquis of Landsdown, who is one of the largest landed proprietors in the county of Kerry. To the east of the old iron and copper works a trial was made some years ago on a lode which occurs along the line of junction of clay-slate and limestone, the south wall of the lode being limestone, and the north wall clay-slate. Between the lode, however, and the true south wall there are thin sheets or partings of smooth polished black metallic like substances resembling slickensides. The lode near the surface is of great breadth, and produced considerable quantities of iron ore and large quantities may still be raised, but in sinking a rich deposit of grey, purple, and yellow copper ore was discovered under the surface, and still continues. Parallel with the copper lodes are some silver-lead lodes in the limestone, on which surface works were carried out along the line of the lodes some hundreds of years ago. A quantity of grey copper ore was also discovered in the lime rock, specimens of which I have seen taken out of the old works yielding between 40 and 50 ozs. of silver per ton of ore, besides a high percentage of copper.

THE MINERAL RESOURCES OF THE WEST COAST OF SUMATRA. The interesting report of Mr. John Munday, on the Gold Mining in the West Coast of Sumatra, which has already been fully referred to in the *Mining Journal*, continues to attract attention. He states that he had not time to make a strictly detailed examination of the country passed through, and that as a rule it was not easy to get clear full statements from the natives. The districts visited were those of Soupayang, Grabak, Soungie Abou and Si Begoyo, and Telaki. The rock formations in which the quartz veins yielding gold occur are chiefly slates. Bordering on the slate strata are fields of granite and rocks of the greenstone class. Syenite also occurs. The greenstone also occurs as dykes in the slate. The gold found in the quartz veins is generally of a heavy description, pieces of several ounces weight being sometimes met with. It is also generally accompanied by iron pyrites, and at some places, as at Soupayang the auriferous veins contain sulphide of antimony and gentiferous galena. The standard of the gold varies, sometimes being very good, and at other times low, on account of its being alloyed with silver. There is at present but little mining going on in the districts he went through, but there are indications in the old mine works that at some former period mining was much more active than it is now. The native appliances for separating the gold are of very primitive kind. Gravel mines are found scattered over a wide district. The native miners exhibit considerable intelligence in the mining for gold, but the extent of their acquaintance with mining does not go beyond the most rudimentary conditions; they are neither skilled in pumping machinery nor in blasting hard ground, and they have but limited acquaintance with timbering, so that there is room for more advanced skill to come in where their deficiencies occur, and where they leave off.

SAPPHIRES AT BANGKOK.—In a report which has just been issued by the Foreign Office Mr. Newman, the British Consul at Bangkok describes a great gem "find" which we do not remember to have seen previously noticed. Sapphire mines have for a long period been worked in the Siamese provinces of Battambang and Chantabong, but they were considered of small account and seemed to offer little temptation to the adventurer. The district, however, was neglected because no one knew or suspected the full extent of the mineral wealth that was hidden away in it. It was reserved for a hunter to make the discovery which has since yielded such surprising results. Five years ago this man discovered new mines of great value, but it was not until 1879 that tidings reached the gem hunters of India and Burmah of the rich deposits that lay awaiting their exploitation. There was at once a rush to the sapphire diggings, and during the whole of last year British subjects poured in large numbers into the two provinces. It has been found impossible to obtain anything like accurate information as to the value of the stones picked up by the diggers. The more fortunate finders are believed to have made but a very partial disclosure of the amount of their winnings, and this for the perfectly intelligible reason that the Siamese authorities have been suspected of an intention to impose an *ad valorem* duty on the produce of the mines. There can be little doubt, however, that in many cases the gains have been large. Mr. Newman mentions the case of a "poorly clad and miserable-looking individual" who had just come down from the diggings, and who was asked to show the British Admiral some specimens of the gems he had collected. The man was reluctant to display his treasure, but first he produced a few small stones, and it was only after much coaxing that he was induced to bring out a very large sapphire in the rough, which he valued at 20,000 rupees, or 2000*l*. sterling. Another instance of similar good luck is given. "There is a man now at Bangkok who dug out a stone which he offered for sale in Chantabong at 1000 rupees, but he did not find a purchaser. He went with it to Rangoon, where he was offered 15,000 rupees; but, having then arrived at the value of the stone, he declined to sell and took it to Calcutta, where he eventually obtained 30,000 rupees for it." So far as Mr. Newman's information goes, the largest sapphire hitherto found in one which weighed 370 carats in the rough, and which when "turned out 111 carats of the finest water"—certainly a handsome prize for the miner who had the good fortune to secure it. But the storehouse of gems has its drawbacks. Immense numbers of the diggers have died from jungle fever, and Mr. Newman is of opinion that "the broken health and emaciated appearance of most of the men who return will check the eagerness of others to try their fortunes in this fever-stricken district."

HOW MINERS WORK IN AMERICA.—At West Seton meeting, Friday, Mr. John Rule (brother of Mr. W. H. Rule, shareholder in Camborne), in response to the toast of his health, made some very interesting remarks on the hardships and hard work Cornish miners have to undergo in Nevada, to which place in North America, so many Cornishmen emigrate. He stated:—"I worked underground, in England, at Dolcoath, under Capt. Charles Thomas and Capt. John Thomas. Some years ago I went to Nevada, and if any fellow wants to know what hard work is, there is the place to go. It is true we earned capital of \$4 (16*s*.) a day, equal to 24*l*. 10*s*. per man per month, but to do so we had to work under so many slave-drivers, and to work like slaves. We had to work long hours every day, and Sundays and Mondays all alike, for there is no Sunday there kept holy—we had to work on Sundays the same as on week days, and sorts of hardships and privations had to be endured, and the great want of



mainly dull, and no permanent signs of revival are to be discerned. It is probable that a new slate quarry will be started near Llangynog, for it is reported that a company is being formed to work the Glanarafon Slate Quarry, near that village. Any renewal of work in this neighbourhood would be welcome, for most of the mines and quarries here are now idle.

The subject of the North Wales Institute of Mining Engineers, of which nothing has been heard for a long time, was again brought to light by "Enquirer's" note last week. Is it owing to the promoter's absence in Norway on mining business that we have heard but little of this lately, or is it owing to the small support which the scheme has received? I believe I am correct in saying that up to a recent date the list of intending members did not contain 20 names. This, of course, cannot be encouraging to the promoter, but it is to be hoped that even if he cannot procure enough of subscribers to warrant the formation of the Institute and the holding of field meetings this summer he will receive a sufficient number of names to justify him in calling meetings for the winter evenings.

### REPORT FROM NORTH AND SOUTH STAFFORDSHIRE.

REPORT FROM MONMOUTHSHIRE AND SOUTH WALES.

*June 24.*—The preamble of the Pontypridd, Caerphilly, and Newport Railway Bill has passed the Commons committee. The opponent of the Bill, the Taff Vale Company, has consented to an arrangement, and there is no doubt now that the Bill will pass through the House of Lords without difficulty. The advantages to the port of Newport must be great, as it will bring it in direct communication with the Rhondda and its rich mineral resources. An extension of the dock accommodation will then probably take place, as the increasing traffic will in some way have to be provided for.

A presentation has been made at Rhymney to Mr. F. Hilston, chief engineer at the Rhymney Works, who leaves amid expressions of regret to undertake a similar position under the great firm of Messrs. Bolckow, Vaughan, and Co. Mr. W. Griffiths occupied the chair, and an address was presented, as well as a purse containing 20 guineas.

The Iron Trade of the district has not been over active during the past few days. Clearances have been tolerably good, but go to show that a falling off has taken place in the American demand. No such large shipments to that quarter have been made. At the Maesteg works a portion of the men have already agreed to go to work, and from proceedings already taken it seems that the rest will shortly follow. The Bessemer steel department is tolerably active as times go, but as present orders are being worked out others do not take their place. The enquiry for rails cannot be said to be on anything like a large scale. Bars, too, are in very little request, except on local account. The pig-iron department is also the reverse of active. Prices have not materially changed, and if the demand does not improve it is feared that they will go still lower.

The Tin-Plate industry has been rather dull, and at some of the Monmouthshire works the proprietors are already reducing wages. In the western portion of the district it is believed that the make will be restricted. Prices are very low, and stocks are accumulating.

The Steam Coal Trade may be reported as good, especially in the Rhymney Valley. The pits are working tolerably well. Prices have not changed to any extent, and some large orders have recently been received. Shipments have been quite up to the average, and on foreign account they have been remarkably good. Patent fuel has been somewhat slow, and coke has been very little enquired for.

REPORT FROM DERBYSHIRE AND YORKSHIRE.

*June 24.*—Trade in both the northern and southern parts of Derbyshire is particularly quiet, and a large number of workmen are only employed three or four days, whilst a considerable number are entirely idle. In the lead mining districts there has been little or no change; but that industry has not grown of late years the same as most others have done, so that there has been no increase in the number of persons employed in the mines, but rather the reverse. It is not so, however, as regards coal mines, the number of which has been increasing every year along with the production, and the consequence is that the output has got far in advance of the demand, necessitating the limitation of the output. House coal has become a drug in many markets, and the prices obtained for it were such as to leave no profit to the mine-owner. To London less is being sent, although the quantity is probably up to the summer average; but the competition has become so keen that the charges to consumers have been lower than for many years—lower, indeed, than anyone can recollect—Silkstones being delivered at 20s. per ton. At some places the men have been asked to submit to a reduction of wages, but have refused to do so, notwithstanding that they must be well acquainted with the state of the trade. Of late there has been a better demand for steam coal for exportation, whilst rather more is being absorbed by the railway companies. Gas and ordinary engine fuel have undergone no change, whilst the output of coke is kept up to the average. So far as regards pig-iron, there has been no decline in the make; but the demand for it appears to have become less, causing stocks to get larger. Consumers are not at all anxious to purchase even at the present low rates, but the requirements in Sheffield and other places have fallen off, owing to less being done in finished iron. Hopes, however, are entertained that some improvement will take place as regards the latter, and so lead to an increased consumption of the raw material. At the rolling mills a moderate business continues to be done in merchant iron, a good deal being sent to Sheffield, where the principal firms warehouse a considerable tonnage. At the foundries affairs remain in much the same state as they have been for some time past, there being no discernible activity at any of the works. Some fair orders have been in hand for pipes, but not so much is doing in castings required by builders, for which at this period of the year there is generally a brisk demand. Malleable castings are still in moderate request, whilst business at the steel-rolling works is about the same as it has been.

a Sheffield trade is far from being so brisk as it was a few weeks

In Sheffield trade is far from being so brisk as it was a few weeks since as regards several branches. Ordinary as well as hematite pig does not sell so well, despite the reduced rates at which they are offered, so that transactions in them are as a rule by no means heavy, for purchases do not offer for forward deliveries, seeing that the iron market is not in that settled state which would make it desirable to do so. Large quantities of goods continue to be forwarded to America, which continues to be a good customer for plain and manufactured material. In ship-plates a steady business continues to be done, whilst steel-plates are being more enquired for. Tires, axles, points, and other railway requisites have declined, whilst Bessemer rails reduced in price to something under 7½ per ton have become considerably quieter, the mills working off old orders that have been some time to hand, and as yet these have not been replaced. Armour-plates have become quiet, but there is no doubt that before long there will be considerably activity with respect to them, especially on the part of our own Government, but it will be of those made of both iron and steel, for the old thick iron-plates are not likely to be again resorted to. Some of the old cutlery houses are fairly off for business principally for exportation. Some of the German makers, however for inferior goods are adopting some of our makers' marks, especially in the Levant, and as they sell lower than the Sheffield goods can be produced for they are able to keep a better class of cutlery out of the market. Sheep-shears, both by machinery and hand, have been rather extensively turned out for the Australian and other colonial markets. The foundries are still but moderately employed, and engineers and mechanics have been kept steadily going. At the Parkgate Works there has been considerable activity of late at the plate-mills, and a heavy tonnage has been turned out. At Milton and Eiseccar the furnaces have been turning out the usual average of pig, but the mills are not so busy as they have been. The South Yorkshire coal trade is still in anything but a satisfactory state, houses selling slowly, and at prices that leave any profit whatever entirely out of the question. Steam coal, however, goes off much better, so that stocks are not to be seen of any extent at few of the collieries. A large order has been received on Russian account which has been of some benefit to one place in particular, where the quantity stocked was exceptionally large for the time of year.

At the Monkwood Colliery, near Chesterfield, the men now o

The slate quarries in the Nantlle district continue, and will continue, to be troubled with water until their owners join together to carry out some deep drainage scheme, of which more than one has already been proposed. The latest proposition is to deepen the bed of the River Clynnog, and by this means drain the quarries to greater depth. This, however, would only be half meeting the difficulty, and the additional drainage depth gained would scarcely justify the outlay, especially when it is considered that with a but slightly greater expenditure an adit could be taken from the south, and the whole of the quarries drained to their greatest depth. As the owners of slate quarries less enterprising than those of lead mines that a work of this nature often undertaken in mining is allowed to remain unaccomplished? The slate trade of North Wales still



strike against a reduction of wages, although the trade of the locality is such that the miners are said not to be earning more than 10s. or 12s. a-week. The pits are picketed, so that those who would only be too glad to work are not allowed to do so.

The strike at the Monk Bretton Colliery, near Barnsley, continues, and the old hands have become so demonstrative that as a matter of protection a number of police constables have settled down at the works.

The railway rates for the conveyance to and from various seaports of Sheffield material is now being actively agitated on the part of the manufacturers in the hardware town, with a view to obtaining a considerable reduction, so as to place them on more equal terms with those whose works are nearer to our seaports.

John Brown and Co. (Limited), Atlas Steel and Iron Works Sheffield, have issued their annual report. Including balances brought forward from last year of 20,447l., there is available for dividend, after payment of interest on debentures and preference shares, 56,244l., out of which a dividend of 5 per cent. is recommended, carrying forward 21,973l. The directors express great satisfaction with results of tests of the company's compound steel and iron plates made on their Chairman's patent, and looked forward to considerable orders being received shortly in addition to these on hand. Noticing the extraordinary rise in prices in the latter part of last year, and the severe reaction that has since ensued, the directors state that the prevailing opinion is in favour of an early improvement.

### Lectures on Practical Mining in Germany.

CLAUSTHAL MINING SCHOOL NOTES\*—No. CLVI.

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The two methods of measuring the velocity of the air currents mentioned in the last lecture are obviously out of place in coal mines, and cannot be of much use where some degree of exactitude is required. For this purpose instruments called anemometers are used; and these may be divided into two classes, pendulum anemometers and fan anemometers.

De Henaut's anemometer, constructed from the designs of M. Deville, consists of a pendulum, to the lower end of which a large hollow globe is attached. The pendulum oscillates on two conical ends of steel screws, which are screwed through the frame of the anemometer. A balance weight slides on the upper end of the pendulum rod, and can be fixed in position by a set screw. A quadrant is attached to the stand of the instrument, and by means of a vernier fixed to the pendulum the distance or height in degrees to which the current raises the ball is read off. A level attached to the stand of the anemometer enables this to be fixed vertical in position, which is necessary in order that the correct angle may be read off. The velocity of the air current is then found by multiplying the angle by a constant, which should be found for each instrument by trial. This rule for ascertaining the velocity by multiplying the angle by a constant can only be correct for small angles. To obtain accurate measurements of the velocity the rule should be—the velocity is equal to the square root of the tangent of the angle, multiplied by a constant.

A pendulum anemometer, invented by Mr. Dickenson, her Majesty's Inspector of Mines, is, or was, much used in the neighbourhood of Manchester. The stand of this instrument consists of a rectangular frame, to which a level is attached, so that it can be placed perfectly vertical. To one side of this frame a quadrant is attached, by means of which the angle through which the pendulum is raised by the pressure of the wind can be ascertained. The lower part of the pendulum below the axis about which it oscillates consists of a rectangular frame, closely fitting the frame of the stand. This frame is covered over with taffeta. A short rod bent to pass the upper side of the frame of the stand, and having a balance weight at the upper end, completes the pendulum. This instrument is very handy, and is used in some of the continental mines, where the amount of ventilation is measured three times daily.

The chief disadvantage connected with the use of pendulum anemometers is the difficulty of reading off the angle with any great amount of exactitude, and also that to obtain accurate results the square root of the tangent of the angle read off ought to be the main basis of calculation, though a table of square roots of the tangents of angles could readily be supplied with each instrument.

Coombe's anemometer consists of an axis with four flat wings formed of Dutch metal, which are attached to a light frame in such a manner that the plane of the wings is inclined about 30° to the axis. A portion of the axis is cut to form a worm, which gears in with a wheel, the axis of which moves a set of counters, to which a stop or locking arrangement is attached. The time is noted as usual by means of a seconds watch. The velocity of the air current is found by multiplying the number of revolutions per second by a given constant, and adding a second constant to the result. The constant multiplier and the second constant must be determined separately for each instrument. Coombes determined the value of the constant by the method of the least squares, and found the value of the constant multiplier to be .0916, and the added constant .2578, the resulting velocity being given in meters, and the number of revolutions being observed per second. Savary, who found the value of the constants to be pretty nearly the same as those given by Coombes, made his observations by walking through a long room with the instrument in his hand; whilst Coombes attached the instrument to the end of a rigid rod a meter in length, which was moved radially about the other end by means of clock work, and so deduced the value of the constants. This anemometer is much used in France and Belgium.

Biram's anemometer, which is that generally used in England, consists of an axis, with 12 wings made of gummed taffeta attached to it, the projections of which on a plane at right angles to the axis form a complete circle. The plane of the wings is inclined at from 30° to 45° to the axis about which the wings revolve. The axis of the instrument forms a screw at one end, by means of which a set of decimal counters is worked, the figure hand of one disc pointing to tens, a second to hundreds, a third to thousands, and so on. These are managed to give the velocity at once in feet per minute, and not the number of revolutions. In some of the older and larger instruments the counting arrangement is fixed at the top of the instrument, just below the handle from which it is held suspended. In the newer and larger instruments the counting arrangement and the disc from which the velocity is read off are placed in the centre of the instrument. The anemometer in its old form is unprovided with any stopping or locking arrangement, the reading being taken at the commencement and at the end of the observation, the difference being the number required. More lately Biram's anemometer has been constructed of a much smaller size, 6 in. to 4 in. diameter, instead of 12 in. diameter, which was at first universal. The counting arrangement is generally arranged in a second circular flat disc or box, placed at right angles to the first, and in such a position as not to block the passage of the air currents after leaving the wings. The wings of these smaller instruments are generally made of thin sheet metal, and the counting works provided with a starting and stopping arrangement. The readings given by this anemometer generally require correcting, for which a special table is sent out with each instrument. In Germany it is preferred as the more correct method to make use of Biram's anemometer, in connection with some formula, as in the case of Coombe's instrument. Herr B. Crossmann derived the following rule for a Biram's anemometer made by Groten, of Elberfeld. The velocity in meters per second is equal to the sum of the constant 0.454, plus 0.8313 times the number of revolutions per second. In England the readings of Biram's anemometer are adjusted by comparing the readings of the anemometer with the velocity of the air current, ascertained by means of powder smoke, and cannot, therefore, be relied on as being very exact.

\* Being Note on a Course of Lectures on Mining, delivered by Herr Berggrath Dr. von Grob-Deck, Director of the Royal Bergakademie, Clausthal, The Harz North Germany.

In addition to the above there are three other anemometers, that may be used to ascertain the velocity of an air current; but inasmuch as they do so by observing the pressure of the currents, we may consider them in the first place as manometers and afterwards as anemometers.

The first and simplest of these is the ordinary water gauge, which consists of a U shaped glass tube, open at both ends. The upper end of one leg is cut at right angles. The tube is partially filled with water, and by means of a moveable scale, divided into inches and 1-10th of an inch, the difference in height of the water in the two legs can readily be read off. The instrument is generally fixed at some place, so that the horizontal bend of one of the legs can be inserted tight into a hole in a door or stopping separating the main intake from the main return air current. The difference in height of the two legs expresses in inches the height of the water column which balances the difference of pressure. Since the weight of a cubic foot of water is 62.4 lbs., the weight or pressure of a column of water 1 in. high over a surface 1 ft. square is 5.19 lbs., and consequently by multiplying the reading of the water gauge in inches by 5.19 we obtain the difference in pressure of the intake and return current on 1 ft. area square expressed in pounds.

If the ordinary water gauge be taken into an air current, and placed with the short horizontal bend of one of the legs facing the current, the pressure of the air current would cause a difference of level in the two legs. The velocity of the air current is obtained by multiplying the square root of this height by a constant, and adding a second constant to the result.

The great objection to the use of the ordinary water gauge for ascertaining the velocity of an air current is that the readings cannot be obtained with sufficient exactitude. In order to increase the difference in height for a given pressure, and consequently for a given velocity, the following arrangements have been designed by Robinson and Wollaston.

Robinson's manometer, or anemometer, consists of a U shaped glass tube, one leg of which is about twice the length of the other. The shorter leg is bent at right angles, and connected with a horizontal tube of much smaller diameter, which ends with a mouthpiece of the same diameter as the U shaped tube. Before use the tube is filled with water in both legs to the level of the narrow horizontal tube. Water is added, till the narrow horizontal tube is filled. The tube is held inclined whilst being filled, and the thumb placed at the end of the narrow tube can be held tightly or loosely, so as to allow sufficient water to run off that the level of the water falls in the longer leg, till it is of the same height as the level of the horizontal tube, when the anemometer is held vertical. If the mouth of the horizontal portion be introduced into the hole in the door or stopping separating the intake and return current, so that the difference in pressure forces the water back along the narrow horizontal portion of the tube, the distance by which the water is forced back measures the pressure of the air. Since a quantity of water will be added to that in the longer leg equal to that driven back in the narrow horizontal tube, and the sectional areas of the longer leg of the horizontal portions are as the squares of their diameters, the length by which the water is forced back in the narrow horizontal portion of the tube is to the amount of rise in the level of the water in the longer leg, as the square of the diameter of the longer leg is to the square of the diameter of the narrow portion of the tube. Thus, if the diameter of the longer leg were five times the diameter of the narrow horizontal portion of the tube the distance which the water is forced back in the narrow horizontal tube is 25 times the rise of the level of the water in the longer leg, so that under this supposition the instrument is 25 times as sensitive as the ordinary water gauge.

Wollaston's differential manometer, or anemometer, consists of a U shaped glass tube, both legs being of the same length. The upper ends of the legs are fitted into the underside of a rectangular box, which is divided into two halves by a vertical plate. The upper end of one leg fits into one half and the upper end of the other leg fits into the other half. One of the halves is provided with a tightly-fitting cover and a short horizontal tube, which is placed in a line opposed to the direction of the air current, or inserted in a hole in the door or stopping separating the intake and the return air current. Before using the instrument the glass tube is filled to about half its height with water, and afterwards both legs and the two halves of the box are filled with oil to a depth of 2 or 3 in. in the box. In consequence of the greater pressure of the air on one side than on the other the level of the water rises higher in the one leg than in the other, so that the difference of pressure of the air of the downcast and the upcast is measured by the difference in weight of a column of water and of a column of oil, each of the height which measures the difference in the level of the water in the two legs. Taking the specific gravity of water and oil at 1.00 and 0.94 we have as the ratio of the difference in weight of a column of water and a column of oil, to the weight of the column of water, .06-1.00 (.06+1.00), or 1-16 2-3, so that the readings of this manometer are nearly 17 times as sensitive as those of the ordinary water-gauge. By mixing the water with alcohol the difference between the specific gravity of the oil and the water may be greatly reduced, rendering the instrument much more sensitive. The last three instruments described measure the difference in the pressure of the atmosphere in the two legs of the manometer. If they are placed in the ventilating current, so that one side is exposed to the full force of the current, and the opposite side turned completely from it, we shall obtain a difference of pressure, to which the velocity of the air current is due. In order, however, to ascertain the height of a column of air of 1 square inch section of the density of the air current, the weight of which equals the difference in pressure per square inch registered by the manometer. The velocity of the air current in feet per second is then found by multiplying the square root of the height by eight.

M. de Vaux, a Belgian mining engineer, has designed a sensitive manometer, which consists of an annular shaped vessel, which is partly filled with water. The lower end of a cylinder, which is closed at the upper end, dips into the water. The inner cylinder of the annular shaped vessel (which is formed of two cylinders) is closed at the upper end by a cover. A pipe is fixed in this cover, and terminates at the opposite end in two branches, each of which is provided with a stopcock. A flexible pipe is attached to one of these branches, so that the space enclosed by the apparatus can be put in communication with the return air current or the upcast shaft. The cylinder which dips into the annular space is suspended from one arm of a balance lever, which can oscillate freely on a pair of knife edges. The opposite end of the balance possesses a counterweight. When the apparatus is used the stopcock of the branch pipe which places the inside of the suspended cylinder in communication with the air is opened, the other branch pipe being closed. The counterweight or weights are so adjusted that the balance beam is perfectly horizontal. The pipe is then closed, and the stopcock of the branch in communication with the return air current opened, and the pressure on the inside of the suspended cylinder being less the cylinder descends. The opposite arm of the balance is now weighted until the balance beam resumes an horizontal position. The extra weight added is, therefore, equal to the difference in pressure of the return air current and of the atmosphere. By dividing the weight added by the sectional area in square inches of the suspended cylinder we obtain the difference of pressure per square inch. The greater the diameter of the suspended cylinder so much the more sensitive will be the instrument. If the apparatus were provided with a divided arc, and a pointer attached to the balance beam, it could be made to register continuously the difference in pressure between the downcast and the upcast air currents.

NEW OFFICIAL RAILROAD MAP OF THE UNITED STATES.—A large and well executed chromo-lithographed map of the United States, showing the routes of and stations upon the various railways, has just been issued. It forms one of the well-known series of Rand, McNally, and Co., of Chicago, and is published in this country by Messrs. Tribner and Co., of Ludgate Hill. The size of the map is about 42 in. by 27 in., so that Pennsylvania, for example, occupies about 10 square inches—a space which readily admits of all the leading cities, &c., being clearly shown, whilst the system of colour-

ing makes the several States thoroughly distinct. As the present map is regarded almost as a key map of the series it is not overburdened with names, which makes it much more easy of reference and enhances its value. The map is well worthy of the patronage of those doing business with, or interested in, the United States.

### A NOVEL GALVANE PLATING PROCESS.

At a meeting of the Royal Dublin Society Dr. J. E. REYNOLDS, Professor of Chemistry in the University, gave some illustrations of a process he has discovered for coating metallic and other surfaces with a brilliant and strongly adherent layer of galvane. The plating of a tube of brass and another of glass was effected at the meeting by simple immersion in a solution which speedily deposited a beautiful mirror-like layer on the material. This layer readily assumed its final polish by friction with a wash-leather, and it bore some severe treatment without giving way. The colour of the deposit was darker than pure silver, but brighter than oxidised silver, and the coated surface can be easily made to assume a peculiar bluish bloom which enhances its beauty. Dr. Reynolds exhibited a number of specimens in iron, steel, brass, glass, porcelain, and ebonite. The glass articles exhibited included two handsome vases plated externally and internally, in order to prove that the effect could be easily obtained through the glass as upon it; and glass plates were converted into good mirrors by deposition of galvane on one surface, thus demonstrating the application of the process to the production of lamp and other reflectors. In porcelain the most remarkable piece shown was a table centre-piece, of Copeland's make, perfectly plated with a brilliant layer of galvane. Ebonite or vulcanite table plates, and ornaments were exhibited coated with the material. The all showed the same fine lustre and colour. Brass tubes, chains, and ornaments similarly plated were placed on the table. The surface obtained on the metal was as good as that on glass, porcelain, ebonite, and the adhesion was quite as strong. Dr. Reynolds showed galvane-plated watch-chains, which he had carried in his pocket for a month, and yet showed comparatively little sign of wear. Articles of polished iron and steel take the plating equally well, and the specimens exhibited were fully plated, and presented fine bright surfaces. All the articles shown had been subjected to the action of the atmosphere of the Trinity College laboratory for a period of upwards of two months in some cases, and all withstood this severe test completely without showing tarnish or rust. Unplated articles of steel tested in the same way were rapidly rusted, but the galvane-plated steel and iron did not show any tendency to rust under the conditions stated. Hence the plating protects the metal from change. Dr. Reynolds mentioned that the cost of his galvane-plating process did not exceed one-eighth that of nickel-plating, while for many purposes it could replace the latter, and even be applied to surfaces that nickel did not adhere to. Moreover, any intelligent workman could quickly become his own plater, and the use of electricity altogether avoided. He also observed that the process had received British and foreign patent protection.

INSTITUTION OF CIVIL ENGINEERS.—The ordinary annual Conversation of the President (Mr. W. H. Barlow) and Mrs. Barlow was held at the South Kensington Museum on Wednesday evening and was attended by an unusually large number of members and ladies, the whole of the attractions of the Museum being at the disposal of the visitors, whilst the band of the Royal Artillery performed an excellent selection from the works of Gounod (Mirella and Faust), Thomas (Mignon), Verdi, Bazzini, De Beriot, and others, interspersed with several part songs, &c., the absence of special exhibits was but little to be regretted, attractive as those exhibits have been at some previous gatherings. The only inventive novelty was the Brush electric light, and even that has been already fully described in the *Mining Journal*. It may be mentioned that two of the large courts were illuminated with eight Brush lamps each. The effect left nothing to be desired; the whole of the beautiful exhibits could be seen to perfection, although upon examining certain individual lamps slight flickering was perceptible, due, as the attendant stated, to the fact of the new engine, only provided a few hours previously, not being sufficiently under control; the movement was insufficient to cause inconvenience. As these annual gatherings are now looked forward to by a large number of ladies and gentlemen who have the honour of being invited, although but remotely connected with engineering science, it is gratifying to learn that the Institution under whose auspices they take place continues its career with prosperity. A new list of members has just been issued, from which it appears that there are now on the books 1217 Members, 1299 Associate Members, 579 Associates, 18 honorary members, and 657 students, altogether 3770 of all classes. At the same period last year the members of the several classes were 1148, 1200, 622, 17, and 591, making a total of 3578, showing an increase at the rate of 5 1/2 per cent. During the past session the elections have comprised two honorary Members, 43 Members, 129 Associate Members, and 15 Associates, and 15 students have been admitted.

THE DETECTION OF GASES IN MINES.—At the Mining Institute of Scotland monthly meeting at Hamilton—Mr. R. B. Baggy in the chair—Mr. Wilson, C.E. and M.E., Glasgow, showed a model of and described an instrument which he has invented for the detection of gas in mines, and which consists of an ordinary unjust balance, made of brass wire, the fulcrum of which is at one-third of its length. On the long end a perpendicular wire is hung; the top of the wire is constructed to grasp a ball filled with common air, and a weight is attached to the lower end to keep the air-ball in position. On the short end of the beam a lead weight moves on a screw for the proper adjustment of the balance, which is connected with an electric bell. When the air-ball is surrounded by gas lighter than common air it descends; when surrounded by gas heavier than common air it ascends; and when the temperature of the atmosphere surrounding the air-ball is increased to 120° it bursts and falls off the brass arm. The balance is thus lightened, and it ascends as when in the presence of choke-damp; and whether the action of the balance is ascending or descending, a connection of the electric current is formed which causes the electric bell to ring, the action referred to being based upon the fact that fire-damp is lighter than common air, with which the ball is filled, and that if held in equilibrium in common air, upon its being introduced into fire-damp, it would sink. Mr. Wilson gave the results of several experiments with the instrument. After some little criticism, he was awarded a vote of thanks for his paper.

NEW METHOD OF OPERATING MINE PUMPS.—A novel arrangement for supplying power from a central station to a number of contiguous mines has been patented by Messrs. MOORE and DICKEY, of San Francisco. Hydraulic pressure generated by steam or water power is used to force water through pipes to the different mines where it is used for operating pumps, hoisting and blowing machinery. It is then returned through pipes to a water tank, from which it is again pumped into the accumulator to be used over again. In operating the pumps at the mines a strong bracket is secured to the ordinary spear or pump rods. A ram or upright hydraulic cylinder is placed under each bracket, so that the piston rod of the cylinder will strike the under side of the bracket and lift the pump rod when the piston rises. A branch pipe is connected with the hydraulic cylinder below the piston. A waste pipe leads from the hydraulic cylinder to a water tank at the central station, from which the water is pumped into an accumulator. A valve is arranged in the length of the branch pipe near the hydraulic cylinder, and another in the waste pipe, and these valves are operated automatically by the motion of the pump rods so as to open and close alternately, thus admitting the water to and discharging it from the cylinders, giving the pump rods a vertical reciprocating motion. It is claimed that by this means an entire mining district, when the mines are conveniently situated, can be supplied with a cheaper and more reliable power than when separate engines are used, and the mines will at all times have command of a larger surplus of power, because two or more engines can be maintained at the central station, each of which is sufficient for ordinary work, so that in case one should become dis-







if the slag is made basic to the extent above specified all of the phosphorus which has been liberated by the cyanide of ammonium from the materials placed in the furnace enters into the highly basic slag, and runs with the same from the blast-furnace.

#### THE COAL TRADE OF THE WORLD—No. II.

(Continued from last week's Journal.)

With regard to what may be regarded as the more recently discovered coal resources of the United States, some very interesting particulars are given by Mr. Saward. The coal of Illinois is found under a marvellous extent of the territory within the borders of the State, but from the quality of much of it, as compared with the coal produced in any part of the Alleghany coal field, there is not such a quantity produced as otherwise would be the case; the quantity received from neighbouring States is as large as the production. The coal found in the Wilmington district is of good quality, as will be seen from the analyses. The output of the district is nearly three-quarters of a million tons. The output of coal in Wyoming and Utah Territories is estimated at 500,000 tons for 1879. The San Pete coal mines, in the southern part of Utah, have attracted attention, and are to be developed shortly. The San Pete coal fields are situated on the easterly slope of the Wasatch range of mountains, which is composed chiefly of the shales and sandstones of the cretaceous and tertiary eras, and contain nearly all the coal and lignite beds in the territory. This coal is of a dark brown colour, highly inflammable, containing less than 2 per cent. moisture, and yielding over 50 per cent. coke, exclusive of ash, which at the present depth ranges from 5 to 8 per cent., and about 40 per cent. bitumen; it might be termed a bituminous lignite, and is essentially different in its composition from the coals of the Rocky Mountains in general. The State of Kentucky is endowed with two distinct coal fields; the output from the western field forms the largest proportion of the sum total. We set the output down as at least 1,000,000 tons. In the western field the most persistent and uniform coal of the series is D, or No. 9; it is from 4 to 6 ft. thick, averaging 5 ft.; it is an excellent coal for grate and furnace, and gives a good coke. A lot of slack from this vein, from St. Bernard mines, Earlington, Ky., washed and coked, gave a bright, firm coke, with only 1 per cent. sulphur. The Louisville and Nashville carries 120,000 tons out of the eastern coal field. There is also a large amount of coal sent out via the Cumberland and Kentucky rivers, and the Ohio from Boyd and Lawrence counties, besides local use. In all we credit this coal field with 350,000 tons. The State of Colorado is growing in importance as a coal producer quietly but surely. The increasing demand for railroad, manufacturing, and domestic purposes will put this State on the record as producing 500,000 tons during 1880. We note the erection of coking ovens in the El Moro district that will utilise the coal hereabouts. Last year 13,000 tons of coke were made that sold for \$585,000, or \$45 per ton, principally used at the smelting furnaces of Leadville.

And, lastly, we come to the coal resources of countries other than Great Britain and the United States. The output of France in 1878 was 17,096,500 metric tons of 2204 lbs. each, or 36 lbs. less than the English ton. What is called anthracite is found in the departments of the Nord, Sarthe, Mayenne, Isere, and Calvados, and the output is 1½ million tons. Lignite is found in Isere, Haute-Saone, Vaucluse, and Bouches-du-Rhone. In the other basins coal only is mined. Something like 2,000,000 tons are made into coke annually. Large amounts of artificial fuel are made annually from the slack or debris. In the Valais, Switzerland, is found anthracite coal with the following component parts by analysis:—Carbon, 88.16; hydrogen, 2.15; oxygen and nitrogen, 1.34; ash, 8.35. The quantity of coal used in the country is 500,000 tons annually, and it is all imported. The use of American anthracite in Europe has attracted attention to the Valais coal, and no doubt the local supply will be developed. The coal area of Belgium is stated at 510 square miles, and the production averages 15,000,000 tons per annum. But little true coal is mined in Italy, although there is said to be good coal and anthracite in the province Udine. Of the lignite there are 125,000 tons raised annually, and 95,000 tons of peat. Great Britain sends 1,500,000 tons of coal to this State annually. The Annuaire Statistique states that the fuel resources of Italy comprise a few beds of anthracite coal of very limited area, and some beds of lignite of tertiary eocene and miocene age. These are found at Valdegno, near Vicenza, Grosseto, Murlo, near Siena, Sarzana, near Spezia, St. Giovanni, near Florence Candino, near Bergamo, and at Gonesse, on the south-western coast of Sardinia. There are also considerable deposits of peat at the foot of the Alps, of which over 90,000 tons are annually raised. In Spain mining for coal dates from 1742, but the output until 1825 was trifling. There is a true bituminous coal and a lignite. The supply is obtained in Leon, Castile, and the Asturias, and the coal-producing area is about 3501 square miles; the output is about 750,000 tons.

The coal basins of Sweden are few and far between. There are, in fact, only two districts where coal is found, the principal one being in the southern province of Skania, and particularly in that portion of the province which forms the government of Malmöhus. The other coal district is in the neighbourhood of the village of Engelholm, on the borders of the province of Christianstad, but it is possibly only an extension of the former, both belonging to the Triassic or Jurassic age. The total output is about 90,000 tons. The Hoganas is the oldest and most important basin, and contains three principal beds of different qualities, but none of them approaching a first-class coal. They are not well adapted for coking, which is unfortunate considering the extent and value of the Swedish iron trade. Coal mining in Russia has not yet met with any great attention from the amount of wood yet available. The supply of mineral, however, is something enormous, and calculations have been made showing a supply equal to possible demands for thousands of years. The German Empire as now consolidated is one of the largest producers of coal in Europe. Since 1870 the Empire includes old Prussia, Saxony, Bavaria, and the States of the Zollverein. The product of coal of all kinds in the whole of the German States amounts to something like 50,000,000 tons annually. The grand total of the output in 1871, when the consolidation of the Empire was completed, was 37,852,464 tons of 2204 lbs. Of the quantity now sent out of the pits Prussia is to be credited with 89 per cent. In Austria coal mining dates back to the year 1550. In 1819 it had amounted to 94,607 tons; in 1825 to 154,944 tons; in 1830 to 211,298 tons; 1835 to 250,782 tons; in 1840 to 469,212 tons; in 1845 to 721,707 tons. After this date the lignite and coal are separated, and in 1878 they raised 5,500,000 tons of coal, and 9,000,000 tons of lignite.

The total area of the Indian coal-fields is estimated at upwards of 30,000 square miles, the largest but three in the world—United States with 500,000, China with 400,000, and Australia with 240,000. In India the amount of coal raised varied a good deal from year to year with a supply of seaborne coal in the market, the latter depending very much on the amount of tonnage available. The supply of coals which had been imported from Australia to India during the last 20 years had now nearly dwindled to nothing. The Indian coals are inferior to English and Australian, although they accomplish good work in locomotives; and but for the expense of land carriage no doubt they would be employed to the exclusion of all foreign seaborne coal. The consumption in British India per annum in locomotives and factories is stated by one authority as being at present 1,000,000 tons, of which one-half was raised from Indian mines, the remainder coming from England, France, and Australia. Other authorities give 4,000,000 as the production of native coal. One of the most important coal-producing countries of the globe is New South Wales; the trade has sprung up within a very few years, and the outlook for the trade is most encouraging, as the coal has been found equal to the English steam coal, and adopted by the Home Government. The approximate area of the coal fields is 24,840 square miles; the production from the opening of the mines up to 1874 amounted to 12,387,279 tons. In 1878 the production was 1,550,000 tons. In 1879 Nova Scotia produced 688,626 tons, being a slight decrease from the preceding year. The coal area of Vancouver Island is estimated at 390 square miles, and the output in 1879, 228,974 tons. Japan from its location may play an important part in the coal trade of the world. There are some 79 seams, but only 10 are more than 3 ft. thick, and at the same time of good quality; 9 others of more than 3 ft. in thickness, of poorer quality, may prove workable

if it should only require care in mining to separate much of their slaty matter. Besides these there are 10 beds of coal between 2 and 3 ft. thick which may be considered of workable character within the long period of time it will take to exhaust even the better beds. The production in 1874 was stated at 396,240 metric tons, and for 1875 at 436,826 tons. We make an estimate of 600,000 tons as for 1879. Skilled artisans and machinery have been taken from France to Japan to erect and work a factory for the manufacture of fuel out of coal dust. There is a completely organised geological survey under Mr. B. S. Lyman, who has estimated that the coal fields of Western Japan contain 620,000,000 tons of coal, or 400,000,000 that could be extracted. China is in possession of coal deposits which are a surprise to the Europeans. Coal was worked 2200 years ago at least. The anthracite basin of Southern Shan-se is so rich that an output of 300,000,000 tons per annum would be available for 2400 years. The annual product is now set down at 3,000,000 metric tons, of which 1,000,000 is anthracite. Further discoveries of anthracite coal are reported in this country. The coal is stated by the Shanghai Courier to be the same as the best American anthracite that is brought to China. The supply would appear to be of great extent, and the new coal has shown itself superior to all other known varieties for smelting purposes. The coal in Chili is of a lignitic character, and amounts to a yearly business of 400,000 tons, of which 50,000 tons are exported. On the contrary, 125,000 tons are imported from Great Britain.

#### FOREIGN MINING AND METALLURGY.

The tendency of the Belgian coal trade has been better, especially in the Couchant de Mons. Prices have not varied, but stocks are being reduced, and the demand absorbs the current extraction, and even allows some collieries to increase their output. The aspect of the French coal trade has not changed, prices have not varied, and the dead season is at its height. The Austrian coal markets have also remained in about the same state. A slight decline was observed last month in the deliveries of lignites. Notwithstanding the talk which has prevailed with reference to a reduction in the production of coal in Germany, the deliveries from the Ruhr district appear to have slightly increased of late. In Silesia also the extraction of coal in the first three months of this year showed an increase of 10 per cent., as compared with the corresponding extraction in the corresponding period of 1879. The intelligence received from the ports of the Rhine is unsatisfactory, as stocks are accumulating.

The launching of the great fixed spans of the Boom bridge has been commenced this week. This bridge occurs upon some lines which the Bank of Belgium is constructing for the State by virtue of arrangements with the construction firm or company. This bridge will possess considerable importance with reference to the relations of Antwerp with Flanders, the North of France, the Hainaut, and even Brussels, in consequence of the construction—already decided upon in principle—of a direct line from Brussels to Antwerp (South), via Boom. The superstructure of the Boom bridge is being constructed by the Belgian Metallurgical Company; it will accommodate a double line of rails, and its total length will be 816 ft. The bridge will comprise a swing bridge 190 ft. in length, said to be the largest work of the kind in Europe. Two of the great fixed spans are expected to be erected in the course of next month; these spans weigh altogether 600 tons. Depression appears to prevail in the Austrian iron trade. Some works of Styria and Corinthia, the order books of which are still pretty well filled—or which, at any rate, have work on hand until the end of the year—do not wish to agree to a reduction of any kind. On the other hand, other works which are without employment are offering their products at lower rates. The German iron markets appear to have slightly hardened, if anything, during the last few days.

A quotation of 9½ ds. per ton for coke-made iron has not been abandoned by forgers in the St. Dizier group; on the contrary, they still maintain it in the case of small orders. As regards orders of rather more importance business has been done at 8½ ds. per ton. Other qualities of iron have followed naturally the course of No. 2, or coke-made pig. No. 3, or mixed iron, has been quoted at 9½ ds. to 10½ ds. per ton. No. 4, or puddled iron, from charcoal-made pig, or equivalent quality, is worth 10½ ds. to 10½ ds. per ton. Fine grained iron has made 12½ ds. to 13½ ds. per ton. There are no real or decided prices to quote in the Meurthe-et-Moselle group. No. 3 pig is sold, however, for the most part at 3½ ds. 6d. to 3½ ds. per ton at Longwy, and 3½ ds. to 3½ ds. 6d. per ton at Nancy. The nominal price of pig for refining at Nancy has been 2½ ds. per ton. In the Ardennes the tone of quotations for iron is far from being satisfactory; the forges are more than ever pressed by Belgian competition. Belgian firms have been offering merchants' iron at 8½ ds. and T iron at 9½ ds. per ton, delivered free at Paris. A contract for five iron bridges for the canal from the Marne to the Rhine has been carried off by MM. de la Vallée-Poussin and Co., of Aubervilliers, in the Ardennes. The Brevilly metallurgical establishments in the Ardennes have been sold to the Longwy Steelworks Company for 35,400l.

#### FOREIGN MINES.

**DON PEDRO.**—Mine Captain's report, dated May 13: General Remarks: The alteration intended as regards jack-head and puppy-lift has been carried into effect as reported in our last. Jack-head, bottom, and cistern fixed under down-right, and column reared the requisite length, and drop-lift put in behind the props, thereby leaving the incline road thoroughly clear for the wagon to work, and wagon put to work this morning. To effect this alteration a great deal of work had to be done before attempting the removal, so as to ensure as far as possible the requisite time or water way. The jack-head lift we had to break in three points for facilitating the work, and drop-lift had to be all disconnected, but fortunately we had good speed and had ample time and water-way, and both lifts are completed and working exceedingly well, and forked to the pile, since when we have dropped 5 ft., and clearing the debris as we work. In the incline one prop taken out to turn the bottom of drop-lift and re-put it (prop) in after turning one additional prop put under same cap, and three sets of side laths renewed that were broken, &c., legs taken out and replaced by new ones, and corner pieces put in to further strengthen the caps. Add Level: The two sets referred to in our last are put in and blocked tight, and back and sides lathed for another set fronting box-plot, and one set of side and back laths changed between No. 1 shoot pass and entrance of add level. Bon Sera Add: This has been in abeyance for a few days, the force being required to assist in making the alteration to the jack head and drop-lifts, &c.—Corrego: One Englishman and four blacks (male and female) washing; results from same moderate.—60-Ft. Wheel, and other Machinery: Various repairs to same have been made, and awaiting ourselves of the stoppages of wheel for the alterations to the pitwork to effect the repairs required to wheel and machinery, consisting of principally changing bolts in Yorks and Cotter's, changing legs of stands of pulleys of horizontal rods at surface that have decayed, changing rolls and pulleys, &c. Wheel working moderately well considering its shabby condition; wheel idle since our last in odd spur 46 hours 50 minutes.—Jiggers: Roof over same being secured, and other minor repairs to the machinery being made, &c.—Stuff: We are continuing to treat the debris accumulated under tramroad or viaduct, to keep the reduction force fully employed.

**Mine Captain's Letter,** dated May 25.—General Remarks: Since our last the puppy-lift has been dropped 19 ft., and incline cleared of debris to below nose of lift—so as to form a good post for the same, and prevent drawing on sand—and lift lengthened as it has been dropped. Judging by the appearances of the choke, we presume that the greater part of the debris has been cleared. The crush was caused, as far as we can see, by No. 1 stope, No. 8 new shoot, collapsing, and water washing out the ground behind side laths and copings in No. 1 incline, caused both laths and copings to shift and fall out. The ground above falling made a run chocking for some sets up to the caps in the No. 1 incline; the ground being almost alternate layers of hard rock and soft, smooth, slippery jacobines. In clearing the debris a large number of big rocks were found jammed around main rods of plunger-lift, some so large as to necessitate being broken before removal.—No. 1 Incline Shaft: A large amount of debris removed, four sets of side laths renewed and double lathed, and packed between laths with capelin (grass) to prevent sand washing out, two props put in, 35 studdles between sets, last set of back laths cradling renewed, all pumps in Vivian's shaft taken out, and shaft spinned abroad, and engine side of incline under down-right covered over cisterns, and 3 fms. of incline boarded up between incline road and lifts, to prevent as far as possible any mishap to jack-head lift by stuff getting into the cistern. The run below has caused a movement in Vivian's shaft, although so far of no material consequence, as far as can be seen yet, by the ground being eased on water rising. No one can tell what may occur; therefore we deem it prudent to be as far as possible on the safe side, and are taking precautionary steps accordingly.—Add Level: Four sets of side laths renewed, and one set of back laths. No. 2 incline started back laths to raise back of incline, to have more room for facilitating egress of ore. The old timberwork is also very defective.—60-Ft. Wheel: This is again idle to undergo repairs, the cranks falling badly, and wheel tumbling and rocking badly. It was put idle at 11 a.m. on the 24th inst., since when north side wood moved back and keys (siding) renewed, the old ones being broken. So many comments have been made on the disastrous loss of time and money, and worry and anxiety, caused by this wheel, not only to the company, but to their employees, that it is unnecessary to make any further remarks.—Bon Sera Add: Fair progress making in clearing the choke.—Viaduct: Two sets of stands studded and propped, and one new leg put in, besides minor repairs. The jigger roof is still in hand.

**ISABELLE (Gold and Silver).**—Foreman's report for week ending May 22: Advance made 65 ft.; total distance from mouth 2642 ft.; from a tunnel 2714 ft. The formation during the week was quite changeable, the time consumed in drilling the face ranging from 3 to 3½ hours, the blasts frequently breaking ground several feet above the tunnel roof, demanding the expenditure of considerable time in placing drill columns in a firm position, often requiring repeated adjustments. We will soon have a sufficient number of cars constructed to warrant my starting the drill carriage, the difficulty with the columns will then be done away with. The new No. 5 "Baker" blower has been placed in position and is doing excellent work.

**RUBY AND DUNDERBERG CONSOLIDATED.**—John J. Kernen: Report for week ending June 2. The north drift from the west cross-cut on the 50th level has been advanced 10 ft.; now 42 ft. from the turntable; the ground is very hard. The whole face is now in low-grade ore and iron of no value (good enough to ship), but the indications are very favourable. A cross-cut will be commenced in an easterly direction during the week, to cut the ore body near the top of the winze and under the turntable over the 400 ft. level still looks well, and some good ore is being extracted, but is not quite so extensive as expected. This is the point at which the ore was first struck, and in our first cablegram (when the strike was made) we reported it to be 10 ft. wide; in stopping it out it does not continue to maintain this size as it extends downwards, but is getting narrower. The 400 south drift, now being run by contract, has advanced 14 ft. around very hard. At the drift on the 350 ft. level there is no improvement, as we are stopping out the ore, which is now about 1 ft. wide. At the upraise above the 350 ft. level the ore body looks well, and is about 4 ft. wide. We have shipped 114 tons during the week, and have twenty-eight men at work besides four tractors and four tribute workers.

—June 22: Telegram from the mine, dated this day: The ore smelted during the week was 70 tons, and produced net \$35 per ton. Receipts from second class ore also \$750. The quantity of ore extracted during the week was 79 tons. N.B.—Owing to the change in the day of the dispatch of the telegram the above only refers to five days' work.

**SALAS.**—June 19: We have a good parcel of ore on the floors, and hope to ship 60 tons, averaging over 20 per cent. for copper, by the first available vessel. The add cross-cut is now within about 2 fms. of the second level, and the shaft from this surface is in a mass of splendid peacock ore. The add level on level No. 1 remains the same, and is worth about 90¢ to the fathom for a long run.

**EMPIRE SUMMIT.**—J. R. Burrows, Summit, June 5: I sent you a basketful sample of the ore from the Empire yesterday. You will find a few small pieces in separate paper, in which you can see from old. The mine will be ready for inspection any time after July 1; it is looking well now, and I am working with all possible speed. I have examined the Bowen strike, and found it larger and richer than I was led to expect. He has a 15 ft. crevice well defined. We expected it all the way across, and got good results by mortar and pan for 12½ ft. in the centre of the lode is covered with free gold. I must say it is the finest thing I ever saw in the shape of a lode, and what makes it important to us is that the course of the vein runs right towards the Empire. Judge Bowen told me yesterday he thinks the Empire is on the same vein. I think I will be taking out \$20,000 rock myself.

**LINARES.**—June 9: In the bottom of the 115, driving east of Warner's engine shaft, there is a very fine lode, worth 1 ton per fathom. The lode in the 120, driving west of Peil's engine shaft, is unproductive at present. The 120, driving in the same direction, has improved, and is now opening out valuable ore ground, producing 2½ tons per fathom. The lode in the 105, driving west of Peil's engine shaft, is worth 1 ton per fathom—rather small. In the 135, driving east of Peil's engine shaft, the lode is again regular and opening out paying ground, worth 1 ton per fathom. The 120, driving east of San Pedro's shaft, is somewhat improved, and is of a promising appearance; worth 1 ton per fathom. The men are getting on well with Warner's engine shaft, sinking below the 120. No. 232 winze, sinking below the 105, is holed to the 120. No. 234 winze, sinking below the 120, and producing 4 tons per fathom, was suspended a short time since in consequence of water. The sinking is resumed, and we hope to get through shortly. No. 235 winze, sinking below the 100, is going down by a very fine lode; worth 3 tons per fathom. No. 236 winze, sinking below the 100, is valued at 1½ tons per fathom, is situated east of San Francisco's shaft. The usual rate of raising was kept up during the past month without difficulty, and the stopes are doing well at present. The works at surface are going on very regularly, and the machinery is in good condition. We estimate the raising for June at 250 tons.—Quintones Mine: The lode in the 100, driving east of Taylor's engine shaft, is regular, with good stones of ore. The 90, driving east of Taylor's engine shaft, although not containing ore enough to value, has very much improved. The lode in the 80, driving east of boundary, is small and regular, and contains stones of ore. The 50, driving east of boundary shaft, and worth ½ ton per fathom, is still of a promising appearance, but has not shown any further improvement. The men are getting on well with Peil's shaft, sinking below the 65. We estimate the raising for June at 75 tons.

**BUENA VENTURA.**—June 9. The 25, driving west of No. 2 shaft, is suspended for the present. In the 40, driving east of Cox's engine shaft, the men were employed about widening the level and other work in the past month. In the 40, driving west of Cox's engine shaft, we have secured the old level, and commenced driving the end. The lode contains stones of ore, principally carbonate of lead. In Cox's engine shaft, sinking below the 40, the men are doing moderately well, and will complete it to a 50 ft. level in the present month. The lode is a very changeable, and at times produces good lumps of ore. A horse-whim is erected on Taylor's engine shaft in La Emma sett, and will be to work forthwith, and by means of this we hope to deepen that shaft, and at the same time unwater some ore ground that will pay for stoping. The buyers are returning fair quantities of ore from the different lodes, and there is a great demand for contracts of this kind, but unfortunately the price of miners is so low as to leave a very small margin of profit to the company.

**ALAMITOS.**—June 3: The lode in the 115, driving west of Taylor's engine shaft, is large and strong, with good stones of ore worth ½ ton per fathom. The 100, driving in the same direction, there are stones of ore in the bottom of the end, but the upper part is of no value. The 85, driving west of San Adriano's shaft, consists of a large, strong, and regular lode. The lode in the 60, driving east of San Victor's shaft, is very wide, consisting of carbonate of lime and lead ore worth 1 ton per fm. The 70, driving east of San Victor's shaft, is a promising and productive lode, valued at 1½ tons per fm. The 70, driving west of San Victor's shaft, has improved, and is opening paying ore ground worth 1 ton per fm. The men are getting on well with Taylor's engine shaft, sinking below the 115. San Jose shaft, sinking below the 30, is holed to the 40. In Canton's shaft, sinking below the 50, there is a very large lode, yielding good lumps of ore valued at 1 ton per fm. The usual raisings of ore were well maintained throughout the past month, and the stopes continue to yield fair quantities of ore. The ordinary surface works are kept on very regularly and the machinery in good condition. We estimate the raising for June at 175 tons.

**FORTUNA.**—June 9: The lode in the 120, driving west of O'Shea's engine shaft, is small and irregular, occasionally yielding good stones of ore; worth ½ ton per fathom. There is no improvement in the 50, driving west of the combie shaft. The 60, driving in the same direction, is smaller and less productive than it was. The 70, driving west of San Pedro's shaft, consists of a strong and regular lode, chiefly of quartz and carbonate of lime and ore; worth ½ ton per fathom. The lode in the 80, driving east of San Pedro's shaft, is lode—producing ¾ ton per fathom—is very regular, but somewhat declined in value. The 70, driving east of San Pedro's shaft, continues unproductive. In the 120, driving east of O'Shea's engine shaft, there is a large and promising lode, worth ¾ ton per fathom. The lode in the 100, driving east of Lowndes' shaft, producing ¾ ton per fathom—is open, easy for driving, and letting out good ore. In the 90, driving east of Carr's shaft, a good ore productive lode was laid open in the past month, and it is looking well at present, being valued at 1 ton per fathom. The men are getting on well with San Pedro's engine shaft, sinking below the 80, which will be completed to the 90 this month. Arista's winze, sinking below the 30, is going down in a large, open, and low lode, worth ¾ ton per fathom. In Rosa's winze, sinking below the 70, the lode is regular, compact, and firm; producing 1 ton per fathom.

**Los Balidos.** The lode in the 175, driving west of Taylor's engine shaft, is a promising appearance, and easy for opening up; it is valued at 1 ton per fathom. The 140, driving west of Taylor's engine shaft, is opening up a great length of profitable lode; worth 1 ton per fathom. The lode in the 175, driving east of Taylor's engine shaft, is very irregular, and not so productive at present as it was a short time since; it is valued at 1 ton per fathom. The 160, driving east of Taylor's engine shaft, has fallen off in value during the past week. The 145, driving east of Taylor's engine shaft, consists of a strong and regular lode; worth 1 ton per fathom. In the 130, driving east of Taylor's engine shaft, and producing 1 ton of ore per fathom, a great length was driven through in the past month. The lode is not so good as it was. The 120, driving east of San Pablo's shaft, continues to open up a great length of splendid lode; worth 3 tons per fathom. There is no improvement in the 110, driving east of San Pablo's shaft. The 100, driving west of Palgrave's shaft, is still unproductive. The same level driving east of Palgrave's shaft is being driven north in search of Quintones' main lode. The new winze (Maureque's) sinking below the 160 is situated east of Taylor's engine, and produces ½ ton per fathom. The usual weekly weighings of ore were kept up very regularly in the past month, and the stopes are yielding moderately well at present. The ordinary surface work is going on satisfactorily, and the machinery is in good condition. We estimate the raising for June at 200 tons.—San Antonio Mine: The lode in the 30, driving east of Henry's engine shaft, is large, open, and easy for getting through; it produces 2 tons of ore per fathom. The 30, driving west of Henry's engine shaft, is also being opened up at a rapid rate, and is worth 1 ton per fathom. In Henry's engine shaft sinking below the 30, and valued at 2 tons per fathom, great dispatch has been made and it is already deep enough for a 45 ft. level.

**SENTEIN.**—June 19: The manager reports as follows: I am pleased to report that the lode in the winze going down in the No. 4 level is now as rich for mineral in the eastern as in the western end, now worth 16 tons of silver-lead and zinc ore per fathom for length of 6 metres and width of 2 metres. We work 2 ft. Stopes continue to look well. No. 4 end has been driven 3 ft., and St. Barbe level 15 ft. Quantity of ore broken 180 tons. Wire rope working well. On Thursday we put the lower section of the new dressing machinery to work, and I consider it answers remarkably well, but I cannot say much about it until we have had a little trial; still I may observe that out of the five hutchies we take lead ore clean and fit for market from three compartments, and zinc ore from six compartments, there being in these five hutchies 20 compartments in all. I consider the boulders wonderfully good.

[For remainder of Foreign Mines see to-day's Journal.]

**HOLLOWAY'S PILLS—SURPASSING EXCELLENCE.**—This medicine is composed of the finest balsams obtained from the vegetable kingdom. Unlike mineral or mercurial preparations Holloway's pills are perfectly innocuous and may be safely taken by children and the most delicate females. The remedy has all who have lost hope and energy through long-continued affliction should have their attention drawn to the many cures of such cases which have been gradually accomplished by these pills, and gratefully acknowledged by the most flattering testimonials. They secure a long and healthy, and a happy life. In all derangements of the digestion arising from the stomach, liver, or bowels, the curative power of these purifying pills is especially observable; they stimulate sluggish and regulate disordered functions.



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# HADFIELD'S STEEL FOUNDRY COMPANY

AWARDED THE ONLY GOLD MEDAL,

AWARDED THE ONLY GOLD MEDAL,



AWARDED THE ONLY GOLD MEDAL AT PARIS EXHIBITION, 1878, FOR CRUCIBLE STEEL CASTINGS. FIRST PRIZE MEDALS AT LEEDS, WREXHAM, AND MANCHESTER EXHIBITIONS, 1875 AND 1876. AND THE HIGHEST AWARD FROM THE MINING INSTITUTE OF CORNWALL, 1878.



ATTERCLIFFE, SHEFFIELD,

MANUFACTURERS EXCLUSIVELY OF

Crucible and Cast Steel Castings,  
FOR  
Engineering & Mining Purposes,

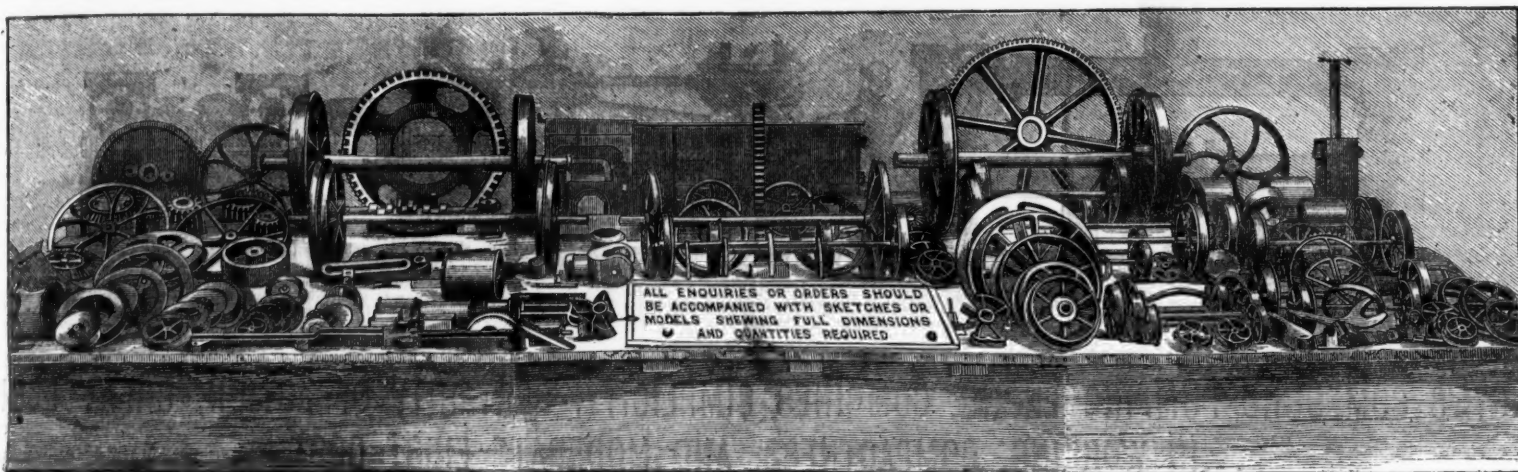
AND ARE THE SOLE MAKERS OF

AT SYDNEY EXHIBITION, 1880,  
FOR STEEL CASTINGS.

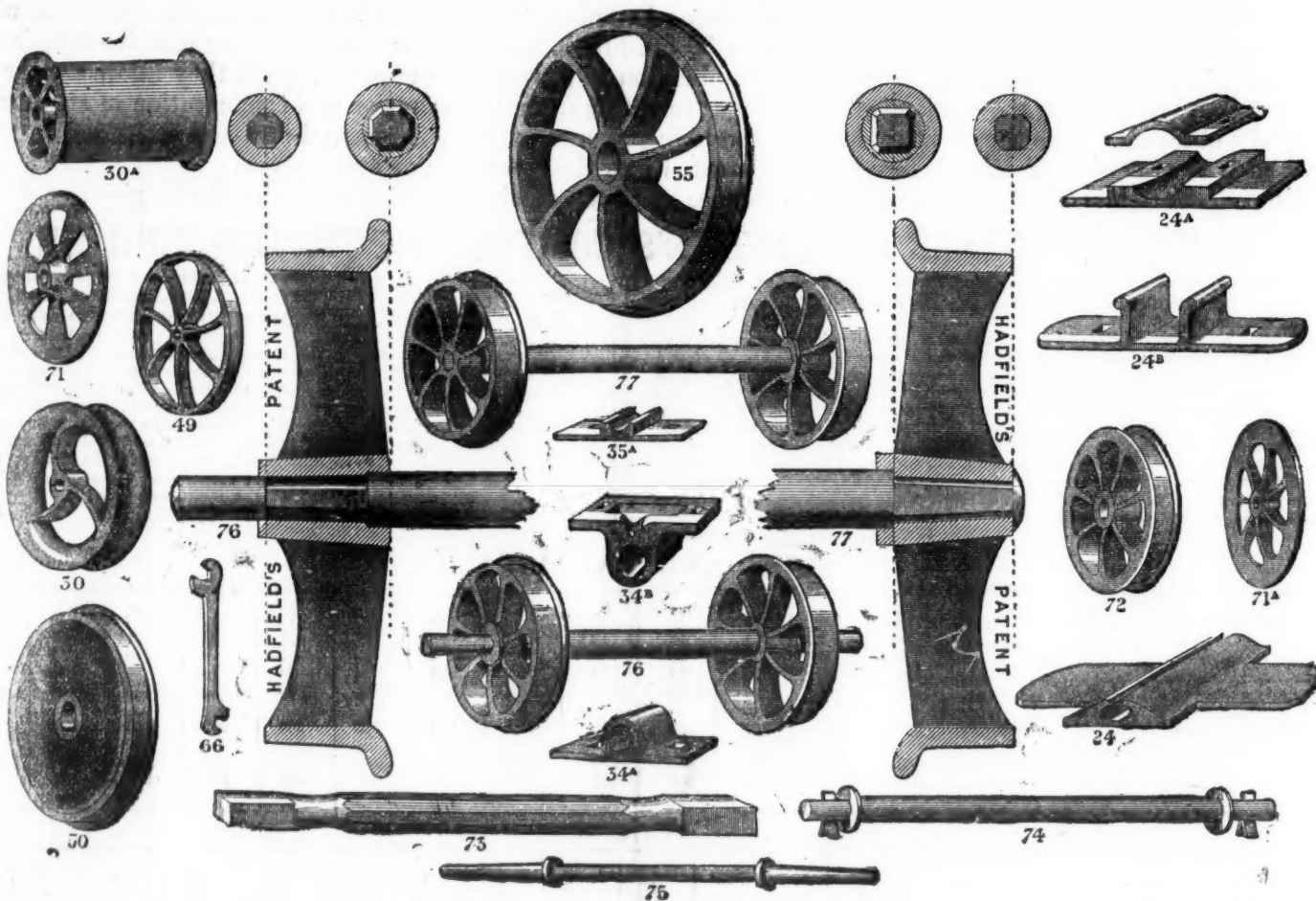
AT SYDNEY EXHIBITION, 1880,  
FOR STEEL CASTINGS.

## HADFIELD'S CAST STEEL WHEELS.

One of our departments is specially adapted for the manufacture of these Wheels (as shown below), for Collieries, Ironstone Mines, Slate Quarries, Ironworks, Lead Mines, &c., &c. We have made, and are now making, many HUNDRED THOUSANDS; and having Patented a New Method of Fitting Wheels upon axles, being cheap, effective, and expeditious, we can execute orders entrusted to us with promptitude, our capacity in this department alone being equal to about 2000 wheels per week.



N.B.—Prices per Set of Wheels and Axles, fitted complete, forwarded on receipt of diameter of wheel on tread, depth of tread, real gauge, and thickness of axles and rolling load.



[This Sheet of Drawings is Copyright.]

### HADFIELD'S PATENT METHOD OF FITTING WHEELS UPON AXLES.

The advantages of the above system are that the Wheels being forced upon a Taper Square-ended Axle, by Machinery, and then riveted (the machine securing truth), it is impossible that they can come loose or get within gauge. They are very cheaply fitted on, and run exceedingly true. We construct the Arms of wheels upon the curved principle (as shown in the drawings above), consequently the shrinkage or cooling of the Castings is not interfered with, thus securing the greatest advantages of our very strong material. CRUCIBLE CAST-STEEL WHEELS, when cast by us, are made from one-third to one-half lighter than Cast-Iron. They cannot be broken while working, even with rough usage and will wear at least twelve times as long as Cast Iron, thus saving animal and steam power, and reducing wear and tear immensely. We would also draw special attention to our INCLINE PULLEYS and CAGE GUIDES, the adoption of which will prove highly advantageous.

### MACHINE MOULDED STEEL GEAR WHEELS OF EVERY DESCRIPTION.





## PARIS EXHIBITION, 1878.

GOLD AND SILVER MEDALS AWARDED for  
Steam-Engines & Boilers, also the Special Steam Pump,  
and Compound Pumping Engine.

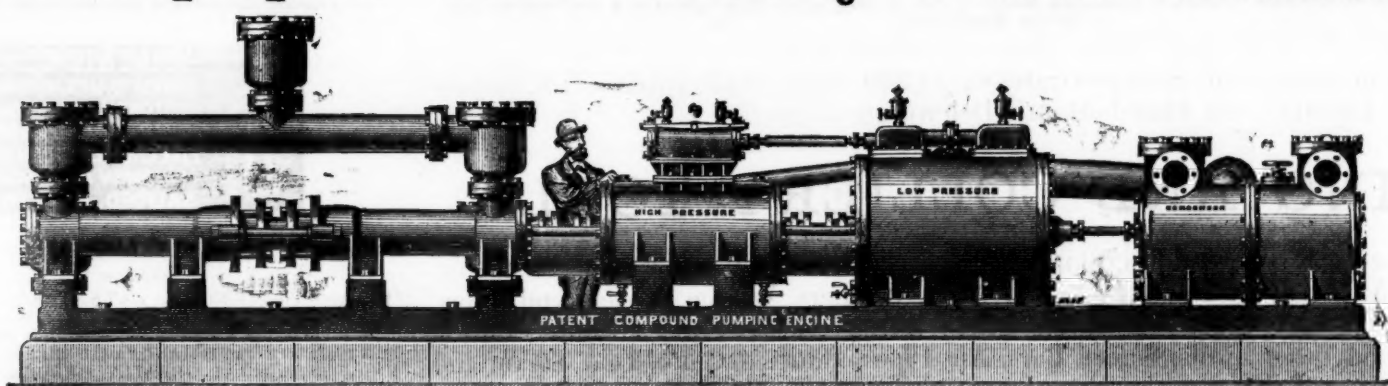


## TANGYE BROTHERS AND HOLMAN,

CORNWALL HOUSE, 35, QUEEN VICTORIA STREET, LONDON, E.C.,  
AND BIRMINGHAM, (TANGYE BROTHERS), CORNWALL WORKS, SOHO.

TANGYE'S DIRECT-ACTING  
COMPOUND PUMPING ENGINE,

For use in Mines, Water Works, Sewage Works,  
And all purposes where Economy of Fuel is essential.



TANGYE'S DIRECT-ACTING COMPOUND PUMPING ENGINE, WITH AIR-PUMP CONDENSER.

TANGYE'S COMPOUND PUMPING ENGINE COMBINES SIMPLICITY, CERTAINTY OF ACTION, GREAT ECONOMY  
IN WORKING, COMPACTNESS, AND MODERATE FIRST COST.

This Engine will be found the most simple and economical appliance for Mine Draining, Town Water Supply, and General Purposes of Pumping ever introduced, and as regards Mine Draining, the first cost is very moderate compared with the method of raising water from great depths by a series of 40 or 50 fm. lifts. No costly engine-houses or massive foundations, no repetition of plunger lifts, ponderous connecting rods, or complication of pitwork, are required, while they allow a clear shaft for hauling purposes. In this Engine the economical advantages resulting from the expansion and condensation of steam are very simply and effectively obtained. The steam after leaving the high-pressure cylinder is received into and expanded in the low-pressure cylinder, and is thus used twice over before being exhausted into the condenser or atmosphere.

The following first-class Testimonials will bear evidence as to the efficiency and economy of the Engine:—

## TESTIMONIALS OF TANGYE'S COMPOUND PUMPING ENGINE.

21' Newcastle and Gateshead Water Company, Newcastle-on-Tyne, Oct. 20, 1879.

36" x 10" x 48" COMPOUND CONDENSING STEAM PUMPING ENGINE.

Messrs. Tangye Brothers.

GENTLEMEN,—In reply to your enquiry as to the efficiency of the two pairs of Compound Condensing Engines recently erected by you for this company at our Gateshead Pumping Station, I have great pleasure in informing you that they have far surpassed my expectations, being capable of pumping 50 per cent. more water than the quantity contracted for; and by a series of experiments I find they work as economically as any other engine of the compound type, and will compare favourably with any other class of pumping engine. By the simplicity of their arrangement and superior workmanship they require very little attendance and repairs, and the pumps are quite noiseless. A short time ago I had them tried upon air by suddenly shutting off the column, and found they did not run away, thus showing the perfect controlling or governing power of the Floyd's Improved Steam-moved Reversing Valve. I will thank you to forward the other two pairs you have in hand for our Benwell Pumping Station.

(Signed)

Yours respectfully,  
JOHN R. FORSTER, Engineer.

The Chesterfield and Boythorpe Colliery Company (Limited),

Registered Office, Boythorpe, near Chesterfield, Oct. 1, 1879.

21"

36" x 12" x 48" DOUBLE RAM COMPOUND CONDENSING STEAM PUMPING ENGINE.

Messrs. Tangye Brothers.

Supplied in January, 1878.

GENTLEMEN,—Referring to the above, which we have now had working continuously night and day for the last 12 months, we are glad to say that it is giving us every satisfaction. It is fixed about 400 feet below the surface, the steam being taken down to it at pressure of 45 lbs. per square inch. We can work the pump without any difficulty at 28 strokes per minute—224 ft. piston speed. The pumping power is enormous. The vacuum in the condenser being from 11½ to 13 lbs. The pump is easily started, and works well and regularly. The amount of steam taken being much less than we anticipated. We consider the economy in working very satisfactory indeed. The desire for power and economy at the present day will certainly bring this pump into great requisition.

Yours truly,  
(Signed)

M. STRAW, Manager.

## SIZES AND PARTICULARS.

	8	8	8	10	10	10	10	12	12	12	12	14	14	14	14
Diameter of High-pressure Cylinder.....In.	8	8	8	10	10	10	10	12	12	12	12	14	14	14	14
Ditto of Low-pressure Cylinder.....In.	14	14	14	18	18	18	18	21	21	21	21	24	24	24	24
Ditto of Water Cylinder.....In.	4	5	6	5	6	7	8	6	7	8	10	7	8	10	12
Length of stroke.....In.	24	24	24	24	24	24	24	24	24	24	24	36	36	36	36
Gallons per hour approximate.....	3900	6100	8800	6100	8800	12,000	15,650	8,800	12,000	15,650	24,450	12,000	15,650	24,450	35,225
Height in feet water can be raised with 40 lbs. pressure per square inch in } Non-condensing...	360	330	160	360	250	184	140	360	264	202	130	360	275	175	122
Ditto ditto ditto—with Holman's Condenser...	480	307	213	480	333	245	187	480	352	269	173	480	367	234	162
Ditto ditto ditto—with Air-pump Condenser...	600	384	267	600	417	306	335	600	440	337	216	600	459	203	203

CONTINUED.

	16	16	16	16	18	18	18	18	21	21	21	24	24	24	30
Diameter of High-pressure Cylinder.....In.	16	16	16	16	18	18	18	18	21	21	21	24	24	24	30
Ditto of Low-pressure Cylinder.....In.	28	28	28	28	32	32	32	32	36	36	36	42	42	42	52
Ditto of Water Cylinder.....In.	8	10	12	14	8	10	12	14	10	12	14	10	12	14	14
Length of stroke.....In.	36	36	36	36	48	48	48	48	48	48	48	48	48	48	48
Gallons per hour approximate.....	15,650	24,450	35,225	47,950	13,650	24,450	35,225	47,950	24,450	35,225	47,950	24,450	35,225	47,050	35,225
Height in feet water can be raised with 40 lbs. pressure per square inch in } Non-condensing...	360	230	160	118	456	292	202	149	397	276	202	518	360	264	562
Ditto ditto ditto—with Holman's Condenser...	480	307	213	154	603	389	269	198	528	363	269	691	480	352	750
Ditto ditto ditto—with Air-pump Condenser...	600	384	267	191	750	486	337	248	660	450	337	864	600	440	937

PRICES GIVEN ON RECEIPT OF REQUIREMENTS.

Any number of these Engines can be placed side by side, to work in conjunction or separately as desired, thereby multiplying the work of one Pump to any extent.

NORTHERN DEPOT:—TANGYE BROTHERS, ST. NICHOLAS BUILDINGS, NEWCASTLE-ON-TYNE.



TWO GOLD MEDALS.

FOX'S PATENT

PARIS, 1878.

CORRUGATED FURNACE FLUES,

NOW APPLIED TO OVER

1000 IND. H.P.

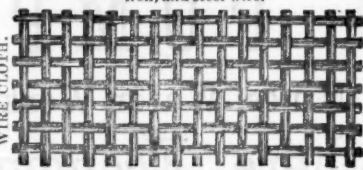
PRICE LISTS AND  
PARTICULARS  
ON APPLICATION.The LEEDS FORGE CO., Ltd.,  
Leeds, Yorkshire.PERFORATORS, WIRE WEAVERS, AND GENERAL  
IRONMONGERS,

J. AND F. POOL,

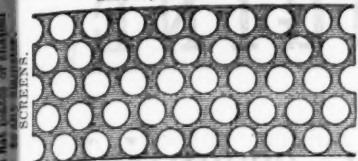
COPPERHOUSE, HAYLE, CORNWALL.

Millimeter holes perforated in sheet-copper, brass,  
IRON, steel, and zinc.

CERTIFICATE OF MERIT

Awarded by the  
Mining Institute of Cornwall  
forSIEVES AND GRATES,  
Shown at the Annual Exhibi-  
tion, 1879.Lineal holes per inch woven in copper, brass,  
iron, and steel wire.

JIGGER-BOTTOMS AND CRUSHER SIEVES.



JIGGER-PLATES AND CYLINDRICAL SIEVES.

Manufacturers of Stamps-Grates, Sieves, and Riddles, for Mining and other purposes, by Self-acting  
Steam Machinery.SPECIALITY.—Thick Copper, Brass, Zinc, and IRON Perforations, Classifying-Sieves,  
Pierced Pulveriser and Stamps-Grates up to 289 holes to the square inch, Copper-  
bottom "Tinsifts" and Hair-bottom "Delewering-serges."

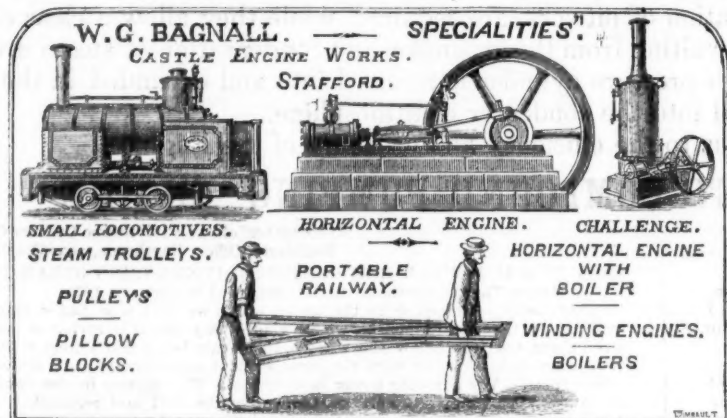
## MINING AND COLLIERY TOOLS.

Picks, Shovels, Rakes, Riddles, Skips, Blowing Tools, Pit Tubs, Crucible Cast Steel  
Wheels and Axles, Tram Nails, Bolts and Nuts, Washers, Wagon Wheels and Axles,  
Springs, Chains and Traces, Harness, Files, Lifting Jacks, Crabs, Cranes, Pulley  
Blocks, Pit and other Rails, Screen Bars, Air Pipes, Brattice Cloth, Gas Steam and  
Water Pipes, Loco Tubes, Smiths' Hearths complete, Smiths' Tools, Powder Magazines  
and Safes, Wire and Hemp Ropes, Pit Tub and Wagon Ironwork of every description.

A LARGE STOCK ALWAYS ON HAND

F. H. WARDEN (LATE THOS. WARDEN & SON),  
BROMFORD IRON & STEEL WORKS, LIONEL ST., BIRMINGHAM.

## W. G. BAGNALL, STAFFORD.

Electric-Bell Signals for Collieries,  
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WITH OR WITHOUT GALVANIC BATTERIES.

NEW SYSTEM—CAN BE RUNG AT ANY PART OF THE ROAD. Cheap, safe, and reliable. Efficiency guaranteed. LINES  
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SYDNEY F. WALKER,

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COMMERCIAL BUILDINGS LONG ROW NOTTINGHAM.

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NEAR VICTORIA STATION, MANCHESTER.

(ESTABLISHED 1790).

JOHN STANIAR AND CO.,

Manufacturers by STEAM POWER of all kinds of Wire Web, EXTRA TREBLE STRONG for

LEAD AND COPPER MINES.

Jigger Bottoms and Cylinder Covers woven ANY WIDTH, in Iron, Steel, Brass, or Copper

EXTRA STRONG PERFORATED ZINC AND COPPER RIDDLES AND SIEVES

Shipping Orders Executed with the Greatest Dispatch.

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CRANSTONHILL ENGINE WORKS, GLASGOW,  
PATENTERS AND SOLE MANUFACTURERS OF  
CHAPLINS' PATENT STEAM CRANES, HOISTS,  
LOCOMOTIVES, AND OTHER ENGINES AND BOILERS  
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MATHEMATICAL, DRAWING, and SURVEYING INSTRUMENTS of every  
description, of the highest quality and finish, at the most moderate prices.  
Price List post free.  
ENGINE DIVIDER TO THE TRADE.  
ADDRESS—GREAT TURNSTILE, HOLBORN, LONDON, W.C.SILVER MEDALS AWARDED AT CORNWALL POLYTECHNIC  
1872 AND 1876.THE WELL-KNOWN PATENT SELF-ACTING ORE  
DRESSING MACHINERY, as in operation at most of the  
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THE PATENTEE AND MANUFACTURER, Mr. GEORGE GREEN,  
Mining Engineer, AT GREATLY REDUCED PRICES; also all  
descriptions of Mining Machinery, includingGOLD AND SILVER AMALGAMATING MACHINERY, complete;  
Stamp Mills, Water Wheels, Steam Engines, &c.

ROLLER SHELLS FOR CRUSHING MILLS—a speciality.

SPECIAL DESIGNS FOR EXPORT AND DIFFICULT TRANSIT.

Prices and particulars on application to the Manufactory,  
ABERYSTWTH, SOUTH WALES.THE SELF-ACTING PORTABLE ORE-DRESSING  
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ABERYSTWTH.THESE MACHINES are constructed to meet the requirements of  
Mountainous Districts, where the transmission of heavy ma-  
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The Machines are complete in themselves, and require no masonry  
or any other foundation, and can be driven by either steam or water  
power.

Estimates and full particulars on application, as above.

IMPROVED ECONOMIC ORE-DRESSING  
MACHINERY.MESSRS. W. NANCE AND CO. beg to call attention to their  
IMPROVED ORE DRESSING MACHINERY.IMPROVED CRUSHING MILL, combining the "Maraden Patent Ston  
Breaker" with the "Improved Cornish Crusher," reducing the hardest rock to  
sand in one operation, and delivering the same in a classified state to their im-  
proved air-cushioned jiggers automatically, and also delivering the slimes auto-  
matically to the slime dressers, effecting an economy of 90 per cent. of labour  
and 90 per cent. of the ore wasted under the old system, and is at the same time  
applicable to all kinds of ore, including gold washing, refining, &c.Improved Air-Cushioned Piston Jiggers and Vanning and Percussion Tables  
supplied, with all kinds of machinery, &c.; Classifiers and Slime Dressers.  
Inspection of Mines at home and abroad. French and German spoken.BUSINESS DONE in all kinds of STOCKS and SHARES, subject to the rules  
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NANCE AND CO.,

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READE BROTHERS,

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High-class Varnishes and  
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For COACH &amp; RAILWAY WAGON BUILDER

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tendent of the United States Special Commissioners of Mines, Mining  
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WARNING VOICE.—A Special Medical Book for Young Men  
on the Cause, Consequence, and Treatment of certain forms of Debility  
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Noises in the Head and Ears, Impaired Sight and Memory, Indigestion, Pains in  
the Back, Headache, Flies, Constipation, Hysteria, Dizziness, Local Weakness,  
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of Nerve power, effect of Overwork, City Life, Worry, Brain Toil, Intemper-  
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## THE GRAND PRIZE, THE TRIPLE AWARD,

Gold Medal, Silver Medal, and Honourable Mention awarded at the Paris Exhibition, in competition with all the World,  
FOR MY LATEST PATENTED STONE BREAKERS AND ORE CRUSHERS.

**Stones broken equal, and Ores better, than by hand, at one-tenth the cost.**

HIGHEST AWARDS  
FROM THE  
MINING INSTITUTE  
OF CORNWALL.

# H. R. MARSDEN,

ORIGINAL PATENTEE AND SOLE MAKER OF BLAKE-MARSDEN

PULVERISERS,  
BONE MILLS,  
MORTAR MILLS,  
&c., &c.

## Improved Patent Stone Breakers & Ore Crushers

**ROYAL SHOW, CARLISLE, JULY 12 TO 16. STAND 208.**  
**MACHINERY IN MOTION—STONE-BREAKERS, ORE CRUSHERS, CEMENT CRUSHERS, PULVERISERS, BONE MILLS, &c.**

H. R. MARSDEN will exhibit in FULL OPERATION—15 in. by 10 in. PATENT IMPROVED STONE-BREAKER and ORE CRUSHER, fitted with all latest improvements.

New PATENT 20 in. by 3 in. FINE CRUSHER or PULVERISER, for making sand for building purposes, and for reducing all kinds of Ores, Limestone, Cement, Barytes, Phosphates, Coprolites, Fire-Clay, Copper, Tin, Zinc, and other Ores, &c., to AN IMPALPABLE POWDER, or to ANY requisite degree of fineness all materials capable of being thus treated.

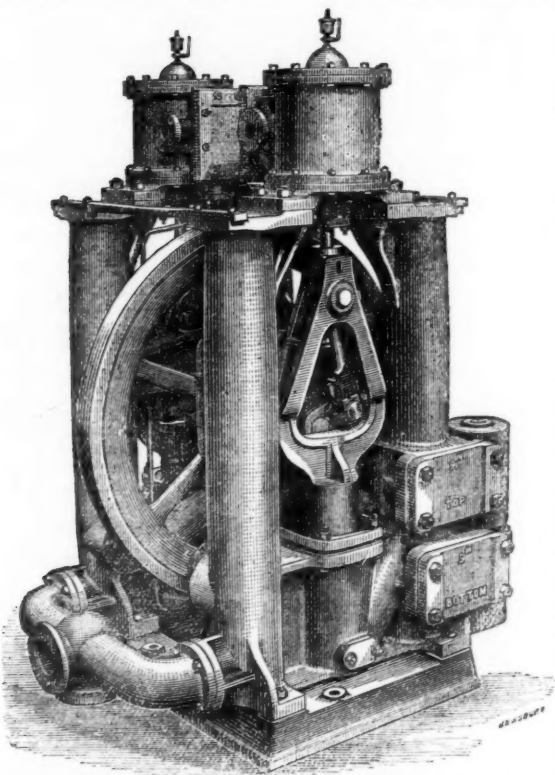
New PATENT HAND and STEAM POWER BONE MILLS, for reducing Bones green or dry to a fine state.

CATALOGUES AND FULL PARTICULARS AT THE STAND, OR ON APPLICATION TO—

**H. R. MARSDEN, SOHO FOUNDRY, LEEDS,**

PATENTEE AND ONLY MAKER OF "BLAKE-MARSDEN'S" PATENT STONE-BREAKERS AND ORE CRUSHERS. AWARDED 60 GOLD AND SILVER MEDALS.

N.B.—Parties are invited to bring Samples to be Broken and Pulverised.



STEAM PUMPS for COLLIERY PURPOSES, specially adapted for Forcing Water any height; also for Sinking; and for Feeding Boilers.

JOHN CAMERON has made over SIX THOUSAND.

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### JOSEPH FIRTH AND SONS' New Patent Brick-making Machine

Embraces the following advantages—viz.:  
Simplicity, strength, and durability. Compactness and excellence of mechanical arrangements, large producing capabilities, moderate cost.

It makes two bricks at once, and will make 12,000 to 14,000 plastic pressed bricks per day, hard enough to go direct to the kiln without drying; or it will make the bricks thoroughly plastic if required. For works requiring a machine at less cost the machine is made to turn out one brick at once, and is capable of producing 8000 bricks per day.

The Machine can be seen at work daily at the Brickworks of the Patentees, JOSEPH FIRTH AND SONS, WEBSTER HILL, DEWSBURY, as also their Patent Gas Kiln for Burning Bricks, which possesses the following amongst other advantages, viz.:—Economy in Fuel, Rapidity and Quality of Work, even Distribution of Heat, and Total Consumption of Smoke.

[See Illustrated Advertisement every alternate week.]

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FURSE BROTHERS & CO., Manufacturers, ROME

Millboard.....guaranteed 95 per cent. Asbestos.

Rope Packing.. „ pure Asbestos.

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The Best and most Economical Steam Packing and Jointing.

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MONEY LENT, at EIGHT, NINE, and TEN PER CENT., on FIRST MORTGAGE of FREEHOLDS for IMPROVEMENTS and STOCKING, said freeholds in the Province of MANITOBA.

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MINE AND QUARRY STANDS, STEEL DRILLS, SPECIALLY PREPARED INDIARUBBER HOSE, TESTED IRON PIPES, &c.



## Air-Compressing Machinery,

Simple, strong, and giving most excellent results, and  
ELECTRIC BLASTING APPARATUS.

Full particulars of rapid and economical work effected by this machinery, on application.

R. H. HARRIS, late

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PARIS EXHIBITION, 1875  
YORK EXHIBITION, 1876.

**SALMON, BARNES, & CO.,**

MANUFACTURERS OF THE PATENT

**ROANHEAD ROCK DRILL,**

ALSO OF

ATKINSONS PATENT



PARIS EXHIBITION  
1878.

## FEED WATER HEATER.

FULL PARTICULARS AND PRICES ON APPLICATION.

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GOLD MEDAL AWARDED, PARIS EXHIBITION 1878.

## THOMAS TURTON AND SONS,

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MINING TOOLS & FILES of superior quality.

EDGE TOOLS, HAMMERS, PICKS, and all kinds of TOOLS for RAILWAYS, ENGINEERS, CONTRACTORS, and PLATELAYERS.  
LOCOMOTIVE ENGINE, RAILWAY CARRIAGE and WAGON SPRINGS and BUFFERS.

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Manufacturers of

**CRANE. INCLINE. AND PIT CHAINS.**

Also CHAIN CABLES, ANCHORS, and RIGGING CHAINS, IRON and STEEL SHOVELS, SPADES, FORKS, ANVILS, VICES, SCYTHES, HAY and CHAFF KNIVES, PICKS, HAMMERS, NAILS, RAILWAY and MINING TOOLS, FRYING PANS, BOWLS, LADLES, &c., &c.

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